A MULTICASE STUDY ANALYSIS OF THE INTERSECTION OF INSTITUTIONAL AND STATE POLICY AND EDUCATIONAL INNOVATION

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ABSTRACT

American higher education institutions, specifically public universities and colleges, have reached a key point in their histories and it is within this moment that these institutions must transform operations, deliver education in new ways, and demonstrate unquestionable social and economic impact. Universities and colleges must increase productivity and find new ways to lower costs, increase efficiencies, and improve quality while delivering education to a greater mass of people over a shortened period of time. "A Multicase Study Analysis of the Intersection of Institutional and State Policy and Educational Innovation" investigates the means by which public research institutions are attempting to address these pressures with technology-enhanced innovations, combined with supportive policies and effective business models. This research provides stakeholders with a greater understanding of the processes involved in innovation adoption, as well as the social, economic, and policy contexts of operation.

The researcher conducted a qualitative analysis of three institutional case studies, the Ohio State University, the University of Michigan, and the University of Texas at Austin, guided by research questions focused on how public research institutions and states develop policies to address higher education productivity challenges, the types of policies or policy amendments public research institutions and states adopt to address higher education productivity challenges, and how successful and failed educational

innovations intersect with institutional and state policies. To generate the case studies, the researcher interviewed institutional leaders, staff, and faculty on each campus.

The research finds that the on-campus technological innovations are changing the higher education landscape regularly and quickly. The three institutions studied are navigating such changes through negotiated modernist and postmodernist approaches to institutional advancement and transformation. These institutions are stretching beyond their traditional policies and paradigms in order to be a part of the discovery process, sometimes voluntarily and sometimes as a concession for internal and external stakeholder pressure. The qualitative design of this study provides readers and researchers with an understanding of the institutional ecosystems and thereby establishes a foundation for future research focused on various dimensions of higher education policy and practice.

DEDICATION

To all those who passionately and tirelessly work to advance the excellence of the American system of higher education so that we may always provide our students with the best educational experiences and our communities with unparalleled opportunities for growth.

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LIST OF ABBREVIATIONS

AAU, Association of American Universities

CCSS, Common Core State Standards

CIS, Course Instructor Surveys

CLSA, College of Literature, Science, and the Arts

CNS, College of Natural Sciences

CoLA, College of Liberal Arts

CRLT, Center for Research on Learning and Teaching

CTL, Center for Teaching and Learning

CTP, Course Transformation Program

DPAC, Deans/Provosts Academic Core

GPA, Grade Point Average

GSI, Graduate Student Instructor

IRB, Institutional Review Board

ISS, Instructional Support Services

ITL, Institute for Transformational Learning

ITS, Instructional Technology Services

MELO, Michigan Education through Learning Objects

MERLOT, Multimedia Educational Resource for Learning and Online Teaching

MOOC, Massively Open Online Course

NINI, New Initiative/New Infrastructure

NSF, National Science Foundation

OSU, Ohio State University

RCM, Responsibility Centered Management

SAT, Standardized Achievement Test

SLOC, Synchronized Large Online Course

STEM, Science, Technology, Engineering, and Math

TCI, Third Century Initiative

U-M, University of Michigan

UCAT, University Center for the Advancement of Teaching

UT Austin, University of Texas at Austin

UTC, University of Tennessee at Chattanooga

CHAPTER I

INTRODUCTION

The current national public agenda for education calls on American colleges and universities to produce more high quality postsecondary degrees and credentials than any other nation while also maintaining and/or reigning in costs. Just as the nation calls on higher education, as a public good, to shepherd the populace out of the current social and economic slump, public financial and social support of the system dwindles. Hence, the field of higher education and its institutions must transform operations and demonstrate impact through valid results; higher education must increase productivity and find new ways to lower costs, increase efficiencies, and improve quality while delivering education to a greater mass of people over a shortened period of time. As key state and national stakeholders work around the clock to address such criticisms through thoughtful research and action, the need for development of innovative practices in postsecondary education continues to grow.

Background to the Problem

"No matter how you cut it, more education pays," (Carnevale, Rose, & Cheah, 2011, p. 20) and as more and more education, economic, and labor experts come to this same conclusion, the field of higher education may no longer be viewed as a luxury good. Rather, higher education will be deemed a means to equitable, and possibly improved, opportunity for social mobility and economic growth. Leading the research and work, organizations such as the

Lumina Foundation and Georgetown University's Center on Education and the Workforce inform and advance the current national public agenda for increased higher education productivity. Motivated by the greater purpose of spurring individual and national social and economic prosperity, the work of such organizations continues to show increased educational attainment benefits, both for individuals and all of society. Clearly, education functions as a means of national growth, and increasing educational attainment may be one of the few attainable and sustainable ways to move the nation beyond the confines of the current recession.

Postsecondary degrees and credentials offer individual earners greater career opportunities and lifetime earning power. Therefore, the Lumina Foundation (2011a) claims higher education "has become the new gateway to the middle class" (para. 1). The Carnevale, Rose, and Cheah (2011) report, "The College Payoff," provides findings on the personal economic benefits of postsecondary degree and credential attainment. Specifically, median lifetime earnings of individuals holding only a high school diploma equal $1.3 million or $15.67 per hour; median lifetime earnings of individuals with some college education but no degree equal $1.5 million or $18.69 per hour; median lifetime earnings of individuals earning associate's degrees equal $1.7 million or $20.77 per hour; and median lifetime earnings of individuals earning bachelor's degrees equals $2.3 million or $27.26 per hour (Carnevale et al., 2011). Data show, on average, the more individuals participate in postsecondary work and attain postsecondary credentials, the greater their lifetime earnings.

Further, greater higher education attainment offers states and the nation a means for moving out of the current economic slump and preparing for the economy on the other side of the recession. According to Georgetown University labor economist Anthony Carnevale, jobs at all levels are lost during recessions, but once recessions end the jobs that come back are those

that require more postsecondary credentials (Lumina Foundation, 2011a). In the "E^2: The Critical Equation of Education and Economic Prosperity" video (Lumina Foundation, 2011a) Carnevale states:

> The economy will recover. The only question is how fast will it recover? We think we'll be fully back online by the end of 2015, maybe early 2016. We know that a very substantial share of the jobs that we've lost that don't require postsecondary education, they are not coming back, and when we come out the other side of this thing there will be a higher concentration of jobs that require postsecondary education. (Lumina Foundation, 2011a)

The compounding effect of providing greater educational opportunities to individuals results in greater social and economic opportunity for states and the nation. "More states are realizing their economic vitality is increasingly tied to getting students into and through college" (Lumina Foundation, 2011a). In the context of the recession, the need for more postsecondary credential earners is not only a matter of individual prosperity, but also one of national economic health:

> Most state policymakers and higher education leaders no longer doubt that the U.S. must dramatically increase the number of students who earn high-quality postsecondary degrees and credentials, because skills and knowledge are the essential building blocks with which economic growth and prosperity are created. (Lumina Foundation, 2011b, para. 1)

While expert opinion varies on the exact number of additional graduates required for national educational and economic growth, the Lumina Foundation estimates a need for at least 60% of American adults to hold postsecondary degrees by 2025. Nearly a 20% increase from the current national estimates, this goal aligns with the Center on Education and the Workforce's estimate that 63% of American jobs will require postsecondary education by 2018 (Carnevale, Smith, & Strohl, 2010).

In addition to enhancing the need for improved postsecondary degree production, the recession also defines the political, social, and economic contexts in which higher education productivity must increase. National, state, and institutional financial resources are limited, if

not shrinking, while costs continue to rise, and individuals must increasingly act as price sensitive consumers. The field of higher education is not immune to this scenario; systems and institutions of higher education must increase productivity by granting high-quality degrees and credentials to more individuals, with fewer resources, at lower costs.

Within these social and economic contexts, the American higher education system finds itself under great pressure from internal and external stakeholders from every sector. A recent New York Times article (Martin, 2012) discusses such challenges and spotlights the Ohio State University (OSU) as an example of an institution in the midst of navigating such pressures. According to Martin (2012):

> College presidents across the country are confronting the same realization, trying to manage their institutions without sacrificing quality….Tuition increases had been a relatively easy fix but now—with the balance of student debt topping $1 trillion and an increasing number of borrowers struggling to pay—some administrators acknowledge that they cannot keep putting the financial onus on students and their families. (para. 5)

The article (Martin, 2012) goes on to share OSU President E. Gordon Gee's succinct statement that "'the notion that universities can do business the very same way has to stop'" (para. 4). The Lumina Foundation, in partnership with higher education policy and practice experts, takes this need for change and opportunity for enhanced educational attainment steps further. Lumina works with a network of 23 states and higher education systems to increase higher education productivity. Originally, this work was structured in a four-step framework which included:

1. Performance Funding: Targeted incentives for colleges and universities to graduate more students with quality degrees and credentials.…
2. Student Incentives: Strategic use of tuition and financial aid to incentivize course and program completion.…
3. New Models: Lower-cost, high-quality approaches substituted for traditional academic delivery whenever possible to increase capacity for serving students.…
4. Business Efficiencies: Business practices that produce savings to graduate more students. (Lumina Foundation, 2011c, p. 5)

Lumina and its partners initiated this structured and systematic approach, detailed in the "Four Steps to Finishing First" report (Lumina, 2011c), with the intention of improving the capacity of higher education systems and institutions to support student postsecondary completion at lower costs without sacrificing quality. Beginning in 2013, Lumina advanced this framework through the launch of an updated strategic plan to better represent the rapidly changing higher education policy and practice contexts while continuing to aim for 60% of Americans with high-quality degrees, certificates, and postsecondary credentials by 2025.

> Between 2009 and 2025 lie 16 years. Our first strategic plan covered the first quarter—the first four years—and this strategic plan will take us halfway to 2025. We have set the stage for reaching the goal, but we believe over the next four years we must do two things: develop a clear understanding of what we must do to create a system of higher education that can reach much higher levels of attainment, and make real progress toward the 60% goal. (Lumina Foundation, 2013, p. 1)

Lumina's revised strategic plan includes two strategic imperatives, one to mobilize and reach the 60% goal and the second to build a 21st century higher education system, and eight strategies. The eight strategies range from initiating a goal-oriented movement, creating communities of support locally and regionally, focusing greater attention on student success, improving financial aid models, and rethinking higher education business and finance models, to broadening credentialing systems.

Statement of the Problem

How, then, do institutions of higher education best address this call to action? As the OSU example demonstrates, many institutions are looking at ways to streamline business practices and deliver education more efficiently. In instances like the University of North Carolina at Chapel Hill and the University of Texas at Austin (UT Austin), business consultants

conduct audits of institutional business processes resulting in diagnostics and recommendations for improved operational efficiency and strategic planning. In her Chronicle of Higher Education piece, "For Student Success, Stop Debating and Start Improving," Hilary Pennington (2012) focuses on the education quality and student success components of the productivity equation. Opportune areas for focused reform efforts include public finance of higher education, traditional semester and credit hour frameworks, application of technology in the classroom, innovation generation, and transparency and use of data (Pennington, 2012). In the conclusion of her piece, Pennington (2012) charges:

> The increasing pressure on higher education to produce more degrees of higher quality at a cost students can afford is both overdue and necessary. But in the end, the most-effective changes will come from institutions of higher education themselves.…Change will require multiple points of view and many people working on the different dimensions of the problem over a sustained period of time. (para. 24-26)

As the focus of much public and institutional attention, technology-enhanced education innovations generate significant publicity within the field among researchers as well as practitioners. Such innovations also demonstrate potential to greatly and sustainably improve higher education productivity. In Daphne Koller's (2011) New York Times article, "Death Knell for the Lecture: Technology as a Passport to Personalized Education," the potential impact technology may have on forwarding the current public agenda is compared to the role technology has played in the American economy:

> Key to this transition was the use of technology—from crop rotation strategies to GPS-guided farm machinery—which greatly increased productivity. By contrast, our approach to education has remained largely unchanged since the Renaissance: From middle school through college, most teaching is done by an instructor lecturing to a room full of students, only some of them paying attention.…Until now, it has been hard to see how to make individualized education affordable. But I argue that technology may provide a path to this goal. (para. 4-6)

Although technology-enhanced educational innovations seem promising, much about how, when, where, and why to adopt and implement such tools remains unknown. Within the context of policy, and the role policy plays in shaping the use of technology-enhanced educational innovations for the advancement of public higher education, our knowledge and understanding is largely, if not only, assumption-based. The following research seeks to clarify this intersection and to increase reader and stakeholder understanding of why, how, and what state and institutional policies help or hinder the development, adoption, and implementation of technology-enhanced educational innovations in lead public research universities.

Purpose of the Study

Higher education productivity success requires collaboration, investment of a variety of resources, and openness to experimentation and adoption of educational innovations. As this study focuses on the intersection of higher education policy and technology-enhanced educational innovation, the researcher intentionally limits the scope to specifically address higher education policy and productivity innovation in terms of educational technologies.

Institutions of higher education may be most highly regarded for the innovations they generate, but much of the innovation created and adopted for the purpose of institutional education delivery is limited, in focus and source, and highly disjointed. Part of the fabric of innovation since World War II, innovation in higher education generally occurs via technology and within teaching and learning centers and practices (Silver, 1999). Silver (1999) attempted to construct a typology from which to analyze and understand higher education innovation, which then led to further examination of the idea of innovation when considered through a policy perspective. The author (1999) concludes: "The study of innovation in teaching and learning is a

study of interactions, attitudes, institutional policies and practices, national contexts, and the consensual and confrontational characteristics of all of them" (p. 155). Silver (1999) ends with questions focused on how innovation may be fostered within educational environments influenced by numerous contextual spheres.

Policymakers also work to spur and steer educational innovation. In 1989, author Frans A. van Vught analyzed the relationship between governmental strategies to drive higher education innovation and the behavior of postsecondary institutions in Europe. van Vught (1989) found restrictive elements and approaches by governmental entities would not spur innovation within or elicit the desired response from institutions of higher education. However, he did find that internal institutional fragmentation encourages innovative behavior at the individual and unit level. van Vught (1989) notes that governments may use this to their advantage if approached in context and in light of external market forces.

It is important to also consider that institutional leaders attempt to spur internal innovation within operational systems and practices. Beyond their teaching and learning core, institutional leaders seek to improve operational and resource management efficiencies. Recent examples of new models include the open learning and business models of Western Governors University's competency-based curriculum, MITx, and Carnegie Mellon's Open Learning Initiative (Sheets, Crawford, & Soares, 2012). According to numerous experts (Christensen & Eyring, 2011; Sheets, Crawford, & Soares, 2012), almost no technological innovation in higher education will succeed without an equally innovative business model for delivery, support, and sustainability.

Rationale and Significance of the Study

Amid shrinking federal and state support for higher education systems and institutions, the current national agenda for higher education calls on institutions to produce the highest number of high quality postsecondary degrees and credentials in the world while curtailing costs. Institutions must transform operations to increase productivity by lowering costs, increasing efficiencies, and delivering high quality education to more students over a shortened period of time. As state and national stakeholders work diligently to address such criticisms through comprehensive and collaborative action, the need for more efficient, effective, and scalable postsecondary delivery processes and practices continues to grow.

To successfully move forward, stakeholders must act with more than just an accurate understanding of public needs and processes of innovation adoption. Stakeholders must also have an accurate and objective understanding of the social, economic, and policy contexts of operation. This study focuses on the last of the listed contexts—the policy context—and seeks to build understanding of the policy context in which states and lead institutions of public higher education must work to meet society's needs through transformed operations and practices. This study also seeks to inform policy development and demonstrate implementation of technology-enhanced educational innovation in postsecondary environments open to adopting and using proven and experimental practices and processes.

Research Questions

As the study focuses on addressing the problem of institutional and state policy creation and implementation conducive to innovation in research university environments, the researcher poses the following questions for study:

1. How do public research institutions and states develop policies to address higher education productivity challenges?
2. What types of policies or policy amendments do public research institutions and states adopt to address higher education productivity challenges?
3. How do successful educational innovations intersect with institutional and state policies?
4. How do failed educational innovations intersect with institutional and state policies?

Definition of Terms

Terminology used throughout the study is of particular importance due to current political and economic contexts across campuses, states, and the nation. Sometimes regarded and received with apprehension, the following terms are often used and interpreted in a variety of ways. An expert advisor on higher education policy issues, Dr. William Massy, Professor Emeritus and former Vice President for Business and Finance at Stanford University, produced a paper to define common metrics for the higher education productivity agenda. The definitions used here include those metrics as outlined by Dr. Massy (2011). Additional definitions provided below stem from resources regarded as informative and useful to the higher education productivity agenda, as well as the supportive national college access and success agenda.

1. Certificates and degrees: Credentials earned by student completers of granting programs and institutions which may be achieved by those individuals who possess a high school diploma as a minimum.
2. College: Education beyond high school at an accredited institution of higher education.
3. College Readiness: The "knowledge, skills, and behaviors to complete a college course of study successfully, without remediation" (Mijares, 2007, p. 1).

4. Effectiveness: Producing, bringing forth, creating, or generating a desired effect (Massy, 2011).
5. Efficiency: The ratio of inputs used to outputs generated.
6. Flipped Classroom: "[A] pedagogical model in which the typical lecture and homework elements of a course are reversed....the term is widely used to describe almost any class structure that provides prerecorded lectures followed by in-class exercises" (Educause, 2012, p. 1).
7. Higher education: Education beyond high school obtained at two-year, four-year, or otherwise accredited institution of higher education. This term may be used interchangeably with the terms "college" and "postsecondary" as defined above and below, respectively.
8. Higher education productivity: The effectiveness by which postsecondary systems and institutions generate outputs (educated citizens and skilled workforces) with the inputs (human, fiscal, and social capital resources) available.
9. High-quality credentials and degrees: The appropriate application of skills and knowledge by students (as they progress from an associates degree, to a Bachelor's degree, to a Master's degree, and so on) as required by employers and necessary to succeed in the workforce.
10. Innovation: The process of creating and problem solving (van Vught, 1989).
11. Institutional Inputs: Human, fiscal, and social capital
12. Institutional Outputs: Educated and highly skilled citizens
13. Massively Open Online Course (MOOC): "[A] model for delivering learning content online to virtually any person—with no limit on attendance—who wants to take the

course. Participants can be students enrolled at the institution hosting the MOOC or anyone with Internet access" (Educause, 2011, p. 1).

14. Postsecondary: Education beyond high school obtained at two-year, four-year, or otherwise accredited institution of higher education. This term may be used interchangeably with the terms "college" and "higher education" as defined above.
15. Productivity: "Effectiveness, especially in industry, as measured in terms of rate of output per unit of input," where outputs are only those desired by stakeholders (Massy, 2011, p. 2).
16. Quintain: "A theme or research question running through multiple cases" so that the end product provides readers with an enhanced understanding of the whole (Stake, 2010, p. 220).
17. Replicable: The ability to duplicate an educational innovation in a new and/or different environment and achieve the same result in both environments.
18. Scalable: The ability to duplicate an educational innovation in numerous environments simultaneously and achieve the same result across all environments.
19. Student success: "Academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational objectives, and postcollege performance" (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2006, p. 7).
20. Technology-enhanced educational innovations: The result of the process of innovation; a product or a change added to an educational environment impacting academic content and delivery.

Methodological Assumptions and Delimitations of the Study

The proposed study is framed by a hypothesis that states and institutions with cultures that value both, and resolutely negotiate the differences between, modernist and postmodernist approaches to higher education also adopt and apply policies that support uptake and spread of educational innovations. Such paradigms lead to delimitations that exclude states, research institutions, and various types of postsecondary institutions from the comparison. For purposes of robust analysis, the researcher decided to focus only on public flagship research universities. The researcher originally planned to include various types of institutions across two states, but quickly realized the differences across the institutions and states far outpaced the similarities, potentially lessening the value of the research product. Additionally, as the productivity agenda and policy pressures impact public institutions of higher education first, the researcher excluded private and for-profit institutions from the study. To maintain a multicase analysis and build a foundation for future innovative work on campuses and research within the field, the researcher looked to flagship institutions as leaders and influencers among their peers and stakeholders within states. As the flagship institutions play a lead role in informing and influencing policymaking and institutional development in most states, the researcher decided to further structure the study to focus on three flagship research institutions.

Finally, the researcher narrowed the study's focus to three states with different contexts, environments, and challenges, but with equal importance to the economic and social health of the nation and with preeminent public flagship institutions. The Ohio State University (OSU), the University of Michigan (U-M), and the University of Texas at Austin (UT Austin) commonly serve as lead institutions in their home states, are regarded as lead institutions nationally, and act as one another's aspirational peers. While these institutions serve in similar capacities at a state

and national level, operationally and structurally they remain quite different and continuously seek to learn from one another. The similarities make a robust analysis possible, while the key differences enabled this study to add reliable, interesting, and valuable research to institutional and state operations, as well as to the body of higher education policy and practice literature. Due to the institutions selected, information gained through this research may influence future work of each institution and peer networks, as well as state and national stakeholders.

Limitations of the Study

The researcher acknowledged that study limitations might include availability and access to key higher education leaders in each institution. While this limitation was not anticipated, it was difficult to predict the schedules and responsibilities of such individuals—even when an interview was scheduled well in advance, a crisis or more immediate responsibility could take priority and lead to a substitute interviewee or a cancelled appointment. Another limitation of the study included the researcher's professional appointment as the associate director of higher education policy at UT Austin. While the researcher anticipated this point actually adding value to the study, the researcher also made adequate preparations to maintain objectivity and credibility. Interview protocols, including interview requests, terms, and conditions, were clear and thoughtful.

Organization of the Dissertation

Organized into five chapters, this dissertation begins in Chapter I with an introduction to the subject matter, background to the problem, statement of purpose, rationale for the study, research questions, terminology that is specific and important to the subject matter, assumptions,

delimitations, and limitations. Chapter II presents a review of literature relevant to the study's subject matter and theoretical underpinnings. Chapter III details the study methodology and research design. Importantly, this chapter reviews the qualitative research methods, including data collection, coding, and analysis that the researcher intends to apply when conducting the study. Results and findings are presented in Chapter IV as a series of three case studies, one focused on each institution participating in the study. Chapter IV includes a multicase analysis, additional findings, and study conclusion including ideas for future research.

CHAPTER II

REVIEW OF LITERATURE

To further the discussion of technology-enhanced educational innovation adoption and use, it is important to establish an understanding of the available research pertinent to innovation uptake in educational contexts. This researcher intends to add to the body of knowledge about why promising ideas in educational environments often fail by conducting a study that delves into the intersection of state and institutional policy and technology-enhanced educational innovation adoption and use. Thus far, researchers and experts have focused on exploring innovation uptake within other contexts, namely institutional administration and constituency engagement. As institutions seek to improve productivity, strategies for reinvention of educational delivery vary widely as does stakeholder buy-in. In the first of the ITHAKA S+R series of published reports investigating online learning efforts, Bacow, Bowen, Guthrie, Lack, and Long (2012) explored the barriers to online learning system adoption in American higher education. Bacow et al. (2012) found many barriers tied to faculty fear of diminished purpose, unwillingness to dedicate additional time to start-up, and lack of material ownership. To overcome such barriers, the authors recommended administrative provision of additional resources, training, and incentives to faculty members. The review of literature addresses issues beyond constituency engagement, barriers of innovation adoption, and diffusion in educational contexts with the inclusion of research from education, policy, organization, and social development researchers.

Designed with the intention of providing readers with a comprehensive examination of the literature and research related to innovations in higher education, this chapter is organized by themes and theories. The chapter first examines the national higher education productivity agenda and the current focus on technology based innovations, followed by the higher education policy context, and concludes with theories believed to influence higher education innovation.

The Public Agenda for Higher Education Productivity

While the purpose and process of setting a public agenda for higher education is not new, the collaborative practice of intently and openly doing so may be a result of heightened social and economic pressures on states individually and the nation as a whole. According to the National Collaborative for Higher Education Policy (Davies, 2006), states can and should "develop statewide public agendas that identify clearly the responsibilities of higher education to meet the educational needs of state residents" (p. 20). Published by a leading national organization for higher education, the Davies (2006) report legitimized and centralized the efforts that many higher education policymakers and stakeholders had already undertaken to spur strategic higher education planning and development and thus aid in relieving the nation, states, and citizens of social and economic stresses. States and stakeholders started the transparent and collaborative rethinking, redesigning, and re-crafting of public agendas for higher education. Unique across the states, the state higher education public agendas adopted post-2006 tend to demonstrate a need for improved student success, increased education quality, and lower higher education costs—later summarized as "higher education productivity" (Lumina Foundation, 2011b, 2011c; Sheets, Crawford, & Soares, 2012).

A 2001 white paper by the Association of American Universities (AAU) cites four key national challenges and demonstrates the role America's research universities can, and must, fulfill to address such issues. The paper (Association of American Universities, 2001) leads with a 1999 quote by Alan Greenspan, former Federal Reserve Board Chairman: "If we are to remain preeminent in transforming knowledge into economic value, America's system of higher education must remain the world's leader in generating scientific and technological breakthroughs and in meeting the challenge to educate workers" (p. 1). Considered rhetoric by some, the tone and content of such discussions set the stage for what now may be viewed as a national call to action for higher education institutions to improve productivity, increase operational efficiencies, improve student success, and contain, if not lower, costs.

The higher education productivity agenda generated from continued national reliance on higher education "as an engine of opportunity and economic mobility in the United States" (Lumina Foundation, 2011c, p. 3). To sustain a healthy American economy, analysts estimate an additional one million more college graduates each year through 2020 will be needed (Cota, Jayaram, & Laboissiere, 2011). In order to achieve such an ambitious goal, "the United States must develop lower-cost, high-quality alternatives capable of delivering education to millions of students whom colleges and universities are not serving as well as they could" (Lumina Foundation, 2011c, p. 3). America must determine how to ensure more citizens earn postsecondary credentials; and higher education institutions must determine how to more efficiently serve as hubs of innovation, generators of knowledge, and producers of skilled workers and leaders.

Though the idea that institutions of higher education should strive to improve productivity is not new, practitioners and researchers continue to struggle with determining how

best to measure institutional productivity. This challenge was most recently detailed in a report produced by a commissioned panel of higher education experts "charged to identify an analytically well-defined concept of productivity for higher education and to recommend practical guidelines for its measurement" (National Research Council, 2012, p. S-1). Following two years of work, the panel concluded that productivity will and should remain central to future higher education debate and development, but that determining a universal measurement for productivity is (at best) difficult due to an array of data challenges and (at worst) currently impossible due to a lack of a universal definition and measurement for higher education quality (Bosworth, Breneman, & Massy, personal communication, June 14, 2012). However, the report's authors dissuade stakeholders from disregarding the concept of productivity due to measurement complexity. Instead, the panelists conclude that there is a sector-wide need for stakeholders to continue debating, testing, and pursuing a productivity measurement so that higher education effectiveness, transparency, and quality continue to improve (National Research Council, 2012).

While the terms of measurement remain unclear, the pressure on postsecondary institutions to improve productivity is immense. States and the nation drive the pressure on higher education to increase productivity—improve access, efficiency, and quality—though both continue to disinvest in institutions while remaining reliant on the sector to spur economic and social growth. For higher education institutions the need to improve productivity is a calling of service as much as it is also a means for survival.

Technology-Enhanced Educational Innovations in Higher Education

As institutional and policymaking stakeholders work to forward the higher education productivity agenda, the primary areas of focus include increasing operational efficiencies, student access, and academic attainment. To accomplish this, stakeholders often look to technology-enhanced educational innovations as a means to more efficiently and effectively educate students at scale. The example of edX, a recently launched online educational entity, is designed to provide low-cost, high-quality educational opportunities to students at scale. Formed as a joint initiative of the Massachusetts Institute of Technology and Harvard University, edX is an organization that aims to develop an open learning platform by which partnering institutions can offer classes, free of charge, to students around the world ("About edX," 2012). Smaller scale innovations, such as individual course redesign initiatives and technology-based simulations, also offer stakeholders promise for improved productivity through increased student participation and content understanding. "To increase their capacity to graduate students, many colleges and universities are instituting high-quality online, blended, and other non-traditional forms of instruction as well as approaches for recognizing students' prior acquisition of knowledge and skills" (Lumina Foundation, 2011c, p. 5). Within the Lumina Foundation's four-step framework, Step Three—New Models—informs and encourages stakeholders to address productivity challenges by adopting new and improved education delivery and attainment analysis means.

In their recent book, "The Innovative University," Christensen and Eyring (2011) focus on the challenges faced by traditional institutions of higher education and the "disruptive" innovations and models institutions adopt to curb costs and efficiently provide students with high-quality educational opportunities. The authors argue that without innovation adoption and

organizational reinvention, traditional institutions cannot meet the growing demands for more flexible, high-quality, and cost-effective educational opportunities (Christensen & Eyring, 2011). Using Western Governors University (WGU) as a specific example and online courses as a more general example of a new educational delivery model, Christensen and Eyring (2011) demonstrate how emerging educational innovations seem to better position institutions to meet the needs of an increasingly diverse student population. Founded by the governors of 19 states as a means of making higher education more accessible to non-traditional learners, WGU is an accredited online university that offers competency-based degree programs to students in all 50 states (Western Governors University, 2012). Similar to the WGU model, though not typically benchmarked solely by competencies, postsecondary institutions use online courses as a means to offer educational opportunities to an expanded, and more diverse, population of student learners.

Compared to the relatively clear institutional efficiency benefits of employing technology-enhanced educational innovations, including the potential for institutions to deliver educational opportunities to more students in a more economical way, measuring the results—the educational quality and output—continues to be a challenge. There is no comprehensive analysis of learning outcomes resulting from technology-enhanced educational innovations and accurate analysis of singular initiatives is often plagued with difficulties due to the number of variables within the learning environments. Of the numerous studies about technology-enhanced educational innovations, the majority are flawed, often for reasons outside the control of the researcher(s), and provide a scope that is too small or contexts that are too unique for the results to be universally trusted and applied (Bowen, Chingos, Lack, & Nygren, 2012). On the other hand, such studies jointly build the foundation of knowledge and, when collectively considered,

their expanded scope can better inform the continuous improvement of innovation tools, adoption, and use.

In the recent ITHAKA S+R publication (Bowen et al., 2012), the authors attempt to overcome the challenges with which prior researchers focused on technology-enhanced educational innovations struggled. They do so by looking into the use of a prototype online statistics course, an interactive online learning course applied in seven instances across six public university campuses. Researchers found that institutional productivity did partially increase as inputs were lowered and cost-savings achieved; however, student learning outcomes (outputs) could not be attributed to the improved productivity. In general, the researchers observed little evidence that interactive online learning innovations available today can, across the board, improve educational learning outcomes. In fact, in the study, only the institution where the tested course was developed saw sustainable learning outcome improvements at scale. However, the researchers also observe:

> This is not to deny, however, that these systems have great potential. We believe that they do, and that vigorous efforts should be made to aggressively explore uses of both the relatively simple systems that are proliferating all around us, often to good effect, and more sophisticated systems that are still in their infancy. There is every reason to expect these systems to improve over time, perhaps dramatically, and thus it is not foolish to believe that learning outcomes will also improve. (Bowen et al., 2012, p. 27)

As practitioners and policymakers increasingly rely on such tools to spur productivity and improve educational delivery and learning outcomes, it is important to learn and understand more about the beneficial and challenging contexts in which technology-enhanced educational innovations are developed, adopted, and used within higher education systems and institutions.

Higher Education Politics and Policy Development

In contrast to the amount and depth of literature available on elementary and secondary education politics, "the politics of higher education literature does not enjoy so productive a state of development. Indeed, politics of higher education as a field of study suffers from acute underdevelopment" (McLendon, 2003b, p. 116). According to McLendon, the field of higher education needs more rigorous research focused on a broader array of issues and inclusive of deeper theoretical underpinnings. Specifically, stakeholders should be interested in developing the body of policy innovation knowledge as "increasing pressures on state budgets, escalating college costs, persistent criticism over efficiency and productivity of postsecondary systems, and emerging challenges of student access suggest a need for new thinking, as well as for nuanced approaches to existing policies" (McLendon, Heller, & Young, 2005, p. 365).

In 1994, Hearn and Griswold looked at the ways in which state level governance structure affects postsecondary policy innovation. They found that the centralization of postsecondary governance systems, the size of the state's population, and the state's geography (location) were associated with innovation in state higher education policy in certain reform areas. For instance, more governance centralization (states with higher education governing or coordinating boards) was found to be associated with levels of academic and institutional operations innovation that are higher than the norm; states with larger populations were found to have levels of academic and teacher education innovations higher than the norm; and the six regions of the United States were found to be associated with various innovation types—the Southeast is more activist in assessment, and the Southeast, Northeast, and Southwest regions have levels of teacher education innovation higher than the norm. Hearn and Griswold's (1994) findings also showed that governance structure impacts educational activities—mainly teaching,

research, and learning—more greatly than it impacts financing and regulatory policies. "A second theme in the findings for governance arrangements is the striking absence of systematic differences in innovation patterns between states with consolidated governing boards and states with strong coordinating boards" (Hearn & Griswold, 1994, p. 183). Therefore, it may be more important to look at the state governance contexts for the purpose of studying the intersection of policy and technology-enhanced educational innovation at the institutional level then it is at the state level.

Theoretical Framework

The study is guided by policymaking, higher education, and innovation uptake theories, which provide the foundation for streamlined and accurate comparisons across states and institutions. First, Kingdon's (1984, 1994) revised garbage can model, also known as the multiple-streams approach, of policy development and organizational theory provides a basis for how higher education policy is crafted. Second, the study itself reflects the unceasing tension in the field of higher education between modernism and postmodernism (Bloland, 1995). Third, the application of educational innovations, in teaching and learning specifically, represents a constructivist approach to postsecondary education delivery and acquisition. Finally, collective impact and social capital theory provide complimentary lenses to study and analyze the uptake and spread of educational innovations.

Higher Education Policy Development Theory

Kingdon's (1984, 1994) revised garbage can, or multiple-streams approach, theory of organizational choice serves as a model for understanding how educational policies develop and move to the top of governmental agendas (McLendon, 2003b):

> The multiple-streams approach conceptualizes three separate streams of activity to flow through the governmental system: a stream of *problems* (consisting of those "conditions" that policy makers have chosen to interpret as "problems"), *policies* (consisting of the various "solutions" developed by issue specialists in different policy communities), and *politics* (consisting of development involving national elections, interest group politics, legislative turnover, and the national mood). (McLendon, 2003b, p. 177)

The model contends that policymakers tend to approach problems with previously crafted solutions; specifically, the theory argues that problems, solutions, and policies develop independently of one another and, under particular conditions, may link together to form a national policy agenda (McLendon, 2003a and 2003b; Ness, 2010). When studying the decentralization of state higher education structures, McLendon (2003a) determined that the multiple-streams model conceptualized the state higher education policymaking processes better than alternative models such as Incrementalism, a framework in which public policy "changes only marginally due to the significant impact of bureaucratic organizations and the behavior of decision-makers within them" (Williams, 1979, p. 683). In relation to the proposed study, the theory of multiple-streams applies to the recent emergence of the national public agenda for increased higher education productivity—the problem being an economic slump and a need for a better educated workforce; the solution being postsecondary education, and the politics being heightened by a highly-partisan government and "the Great Recession."

Ness' (2010) "The Politics of Determining Merit Aid Eligibility Criteria: An Analysis of the Policy Process" starts to fill in some theoretically-based higher education policy research gaps through the application of the multiple-streams approach to his study of the policies

surrounding lottery-funded merit aid in West Virginia, New Mexico, and Tennessee. Ness (2010) found two multiple-streams theory concepts—policy actors and policy windows—to be of prime importance. "When a policy window opens, however, political strategies, tactics, and maneuvers dominate the process. The conceptual and descriptive understanding of these aspects would benefit from studies that more deeply identify and perhaps categorize the various roles and tactics of policy entrepreneurs." (Ness, 2010, p. 55). Additionally, Ness offers the punctuated equilibrium and the diffusion of innovation frameworks to help explain higher education policy processes. The punctuated equilibrium framework holds that long periods of stable policy are interrupted by moments, or opportunities, for policy change and it is important to pay attention to both the stable times and moments of change when assessing organizations as elements in a political landscape (Baumgartner & Jones, 2002; Ness, 2010). The diffusion of policy innovation theory informs understanding of the spread and adoption of policies, and Ness' (2010) findings suggest that policies may not only migrate across regional and state boarders, but media spots and professional networks may facilitate policy spread nationally. In his conclusion, Ness asserts there is a need for additional research on the use and application of information in higher education policy development, deliberation, and implementation.

If the multiple-streams theory provides the foundation for policy development, the diffusion of policy innovation theory helps inform the understanding of policy spread, adoption, and influence. An area of study recommended as ripe for fresh research and application, policy innovation and diffusion theory "focuses on how the social, economic, and political features within a particular state (intrastate dynamics) and the behavior of the state's neighbors (interstate dynamics) combine to influence that state's adoption of new policies or programs" (McLendon, 2003b, p. 181). A discussion of this theory deepens researcher and reader perspective on the

dynamics at play in higher education policy adoption and spread. The McLendon, Heller, and Young (2005) study, "State Postsecondary Policy Innovation: Politics, Competition, and the Interstate Migration of Policy Ideas," applies policy innovation and diffusion to the higher education sector. The longitudinal study seeks to understand the conditions in which states adopt new postsecondary policies by testing "the effects of (a) postsecondary governance structure, (b) state social, economic, and political characteristics, and (c) interstate diffusion pressures on postsecondary policy innovation by state governments between the years of 1981 and 1998" (McLendon et al., 2005, p. 369). The study, designed to test the predictive power of eight hypotheses on postsecondary policy innovation in two areas—financing and accountability—concludes that it is important for researchers to use caution and employ theoretical frameworks, such as Kingdon's (1984, 1994) multiple-streams model, when attempting to predict state governmental behavior. Also, of importance to the proposed study, more specific findings from the McLendon, Heller, and Young (2005) study include (1) recognition that the effect of higher education governance structure on policy adoption may depend on the type or area of the policy; (2) financing policies tend to spread across state borders, often for reasons of competition and normative pressures, and this may hold true for other types of postsecondary policy; (3) the content and comprehensiveness of policy may change as it migrates; and (4) the concepts that states may have policy innovation thresholds and that innovations may have shelf lives. While each point was important to consider during research and data collection for the proposed study, it was also important to highlight the presented opportunities for future research in postsecondary policy innovation, adoption, and spread.

The study intends to advance higher education policy theory literature by applying such frameworks to state higher education and institutional policymaking in its review and

comparison of policies as they relate to educational innovations. The researcher hypothesizes that fragmented policy development hinders the adoption, implementation, and success of technology-enhanced, solution-oriented, educational innovations.

A Postmodernist Agenda

Modernist institutions seeking to meet postmodern societal demands generally look to technology-enhanced innovations as solutions and plugs. Postmodernism supports a comparative analysis of institutional development, application, and use of policy and educational innovation. Though the field of higher education remains traditionally grounded in the ideals, structures, and terminology of modernism, the field is more and more frequently pressured, influenced, and judged through a postmodernist lens (Bloland, 1995). Some readers may perceive this proposed study to be a reflection of the unceasing tension in the field of higher education between modernism and postmodernism.

> [D]eterministic logic, critical reasoning, individualism, humanistic ideals, a search for universal truths, overarching theories about knowledge, and belief in progress, are hallmarks of modernism. The university was a central organization for modernism and the professorate were key figures in advancing modernist premises. (Tierney, 2001, p. 358)

Modernism and higher education share values of meritocracy, knowledge developed through science and research, autonomy, community development, and education as a means of personal and familial upward movement in social class. Engrained in higher education's "DNA", modernist theory represents the field in its most traditional form (Christensen & Eyring, 2011).

The public agenda for increased higher education productivity brings the undercurrent of postmodernist theory to the forefront of stakeholder priorities, institutional operations, and research. Postmodernism, often not readily adopted by higher education modernists, serves as a means for viewing and understanding the current social, political, and economic contexts and

conditions; the theory is also a means for understanding the limits of modernism, particularly during a period of profound change and new pressures (Bloland, 1995). "Postmodernism as a new era concentrates our attention on the impact of the information age, consumer society, commodification, performativity, multinational corporations, and similacra" (Bloland, 1995, p. 533). Performativity can specifically be described as "the capacity to deliver outputs at the lowest cost, replac[ing] truth as the yardstick of knowledge" (Crook, Pakulski & Waters, 1992, p. 31) so that "efficiency and effectiveness become exclusive criteria for judging knowledge and its worth in the college and university" (Bloland, 1995, p. 536). The postmodernism concept of performativity is therefore key to the current national productivity agenda.

To keep in step with this shift in theoretical premise, Tierney (2001) offers suggestions on how to reorient higher education research and understanding. First, postmodernism demands that higher education stakeholders reframe their traditional understanding of what constitutes a university and to be more open to exploring how such institutions may evolve. Second, postmodernism fosters a need for deeper investigation of "the multiple identities at work in, around, outside of, and against, the university" (Tierney, 2010, p. 368). Third, postmodernism necessitates an expansion of methodological approaches to higher education research. These recommendations provide a research basis for the proposed study's dually framed modernist and postmodernist contexts.

As this study addresses the intersection of policy and educational innovation, the modernist and postmodernist constructs characterize successes and challenges faced and embraced by institutions in the process of policy development and application, as well as educational innovation adoption and implementation. The researcher hypothesizes that states and institutions with cultures that value both the modernist and postmodernist approach, while

balancing the differences between them, also adopt and apply policies that support uptake and spread of educational innovations.

A Constructivist Approach to Education Delivery

The application of educational innovations, in teaching and learning specifically, represents a constructivist approach to postsecondary education delivery and acquisition. To provide an objective analysis of the intersections of policy and innovation, as well as the adoption and implementation of innovations in postsecondary institutions, the researcher and readers must acknowledge the constructivist foundations of, and challenges to, such processes.

Constructivist reforms tend to be born in times of pedagogical concern and need (Elkind, 2004). The constructivist paradigm is derived from the field of cognitive psychology and is based on the work of Jean Piaget, Lev Vygotsky, Jerome Bruner, Howard Gardner, and Nelson Goodman (Adsit, 2002; Fosnot, 1996). "The main assumption of constructivism is that knowledge does not exist 'out there' in an objective reality" (Adsit, 2002, para. 9). Constructivist theory emphasizes the development of knowledge on an individual basis by the interactions of persons, situations, and environments, and the acquisition of information and skills derived and refined through the confluence of such contexts. Knowledge is individual, organic, and fresh but it is not viewed as "truth" (Schunk, 2008). To constructivists, learning is an action-oriented process based on discovery, processing, and application, leading to improved learning outcomes and education quality.

The efficacy of constructivism for promoting student learning is rooted in the variety of means by which knowledge may be acquired. This approach may uniquely impact student

learning in that knowledge is not necessarily or clearly predetermined; in fact, student learning is developed on an individual basis, pace, and level. Constructivism when practiced in the classroom is a very different approach to teaching and learning than the more traditional didactic practices. Upon research analysis and review of classroom examples, such challenges are present because to effectively implement constructivist practices an instructor must know the backgrounds and knowledge bases of students; understand student thinking; "employ a range of facilitative strategies to support students' understandings as they engage in the problem-based activities that characterize constructivist classrooms" (Windschitl, 2002, p. 145); support student learning in an effective manner; and work with a variety of student preferences and areas of interest.

In "Developing Communities of Practice Within and Outside Higher Education Institutions," Dutch authors de Kock, Sleegers, and Voeten (2004) provide a different perspective on constructivism through an examination of the means by which information and communication technologies allow postsecondary students and instructors to extend the traditional boundaries of a classroom and approach learning in new ways. The authors focus on the benefits of a social constructivist learning approach in facing the present challenges of higher education institutions of higher education and in addressing the needs of college and university students.

The study by de Kock et al. (2004) challenges the traditional teaching and learning practices of higher education and favors a socially constructivist, collaborative learning approach to education. The authors present "new learning" based on constructivist learning theory. Upon presenting learning as an activity based on the development of problem-solving, reasoning, and critical thinking skills, the authors conclude that the learning process is "the most important

learning goal and educational objective" (de Kock et al., 2004, p. 146). The authors determine "new learning" to be a constructivist, situated, and social activity—constructivist theory recognizing social cognitive strengths.

Elkind (2004) contends the primary barriers to success in constructivist reform implementation are "failures of readiness"—teacher readiness, curricular readiness, and societal readiness (p. 307). "If the majority of teachers are not ready to adopt a constructivist pedagogy, neither are educational policy makers and the larger society. To be successfully implemented, a reform pedagogy must reflect a broad and energized social consensus" (Elkind, 2004, p. 310). However, he goes on to say, technology is changing this and the challenge now is harnessing the technology-based reforms "to the best philosophy of education we have available… constructivism" (p. 312).

Three challenges to establishing the connection of technology-enhanced educational innovations and the pedagogical theory of constructivism may be (1) instructor readiness and motivation, (2) equitability, and (3) lack of resources. Constructivist theory may best promote efficacy in learning for socially advantaged students learning in innovative school settings; students with more social and environmental awareness and experiences may gain more from a constructivist-based approach to learning than students with limited resources and isolated environments. Additionally, implementation of constructivist principles is a resource-dependent and highly individualized instructional undertaking. Due to the primary political, economic, and social pressures of student access and institutional funding, the researcher hypothesizes that the constructivist challenges of instructor readiness, equitability, and resource insecurity may be key barriers to educational innovations harmoniously intersecting with state and institutions policies in public research universities.

Innovation Uptake in Higher Education Institutions: Collective Impact Approach

The practice-based collective impact model offers stakeholders a means for practical application of policy and innovation research to state and institutional engagement and strategic planning (Kania & Kramer, 2011). Collective impact enables a more focused and accurate comparison of the adoption and implementation of educational innovations across institutions within state and campus contexts.

According to Kania and Kramer (2011), broad social reform requires cross-sector collaboration rather than isolated intervention. The theory of collective impact maintains that the impact of educational innovations, regardless if they are good or bad ideas, depends on the level of collaboration among all actors in all contexts. Collective impact theory involves various types of collaborations—including collective impact initiatives, which involve long-term commitments by groups of actors from various sectors coalescing to solve large social problems—as well as five conditions for collective success. For these initiatives to succeed, Kania and Kramer (2011) contend, they must have alignment of (a) a common agenda, (b) shared measurement systems, (c) mutually reinforcing activities, (d) continuous communication, and (e) backbone support organizations.

Such alignment not only readies an environment for collective and collaborative action, but it also fosters social capital. Pierre Bourdieu defined social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (Bourdieu, 1986, p. 248). An individual with social capital is someone who builds social relations and networks that provide reciprocal resources for achieving specific goals: "Unlike other forms of capital, social

capital inheres in the structure of relations between actors and among actors" (Coleman, 1988, p. S98). The value of relationships and interconnectivity in social capital theory "suggests that factors relevant to the generation of innovation include not only the number of partners and the structure of the network but also the level of commitment, cohesiveness and trust embedded in the interorganizational relationships" (Péres-Luño, Medina, Lavado, & Rodríquez, 2011, p. 1369). Social capital theory is paramount to the discussion of innovation generation and uptake in higher education, as it focuses attention on how knowledge is shared, transferred, and borrowed among organizations and individuals. "Tacit knowledge improves radical innovation only when it is embedded in strong social networks" (Péres-Luño et al, 2011, p. 1374).

Frank, Zhao, and Borman's (2004) article, "Social Capital and the Diffusion of Innovations within Organizations: The Case of Computer Technology in Schools," presents an argument for the inclusion of social capital theory in diffusion of innovation theory and technology application in a single conversation. According to the authors, the exclusion of social capital from discussions and analyses accounts for a lack of thorough understanding of diffusion of innovation in the school environment and a lack of innovation implementation. Frank et al. (2004) argue the importance of social capital including social contexts, social processes, and social support in an organizational environment such as school is heightened due to the climate and the multi-level decision-making structure. In a school environment one individual at one level does not make decisions; innovations are not diffused with the buy-in of one person, but rather individuals at every level of the system structure act as independent decision-makers (Frank et al., 2004). Actualized as diffusion within an organizational structure based on multi-level decisions and accountability, the authors state their reasoning for this study, noting that:

> Instead, the process is more one of diffusion of innovation within an organization, since each actor has some autonomy to make his or her own decision partly in response to the

> ideas, information, and other social forces to which he or she is exposed. (Frank et al., 2004, p. 150)

In addition to the traditional channels, the authors highlight three social areas by which diffusion may occur in a school: exertion of social pressure, help due to shared fate, and expertise shared through a social relationship or obligation. Rogers (2003) focuses his diffusion of innovation theory on communication, time, and perceived attributes of innovation including relative advantage, compatibility, complexity, trialability, and observability. According to Rogers (2003), these are the key means and channels through which an innovation may be successfully diffused. The study presented by Frank et al. (2004) gives credit to Rogers' (2003) framework and specifically demonstrates the importance of perceived potential (relative advantage), job conditions (compatibility), personal expertise (complexity), and resources for computing outcomes (trialability). The social system is an important network of means in Rogers' (2003) argument; the social system is recognized as a means of garnering critical mass through effective individuals; homophily, a term noted by sociologists Lazarsfeld and Merton (1954) to describe individuals' tendencies to disproportionately associate with similar individuals; groupthink; and incentives.

Frank et al. (2004) focus on making a case for the expansion of diffusion of innovation theory to include social capital theory. Although Rogers' (2003) work does address the importance and impact of a social system, Frank et al. (2004) suggest Rogers does not take the inclusion of social system far enough; the authors continue to contend the diffusion of innovation theory will not be deep or broad enough to address all organizational structures until the theoretical framework includes specific means of social capital diffusion such as social pressure, shared expertise, and shared fate. Specifically, the authors highlight the lack of recognition of social capital in diffusion practices as the cause of ineffectual process implementation within

schools. While the article's (Frank et al., 2004) conclusion shows a moderate effect of social capital on innovation diffusion, the question of which diffusion and implementation strategies and channels work in educational environments is not lost.

Gladwell (2002), in a constructivist manner, popularized the social aspect of diffusion of innovation theory in unspecific terms in "The Tipping Point." Frank et al. (2004) do not reference Gladwell (2002), probably due to the latter's lack of empiricism and grounded research, but do tangentially highlight similar points such as individual and effective use of social systems. For example, Frank et al. (2004) discuss how teachers are generally inclined to aid one another because of the social pressures and expectations engrained into the common social system in which they operate—a school. Along the same vein, Gladwell (2002) discusses the spread of change, regardless of the point or size of initiation, by means of social systems made up of Connectors, Mavens, and Salesmen. Eventually, according to Gladwell (2002), social systems "morph" such change into "social epidemics."

Relating again to Rogers (2003) and Gladwell (2002), and before concluding their article, Frank et al. (2004) highlight a few points of consideration for change agents. In all three works, change agents must draw on available and innate resources to affect diffusion and implementation of innovation. While the authors focus on effective use of available social capital, Rogers (2003) and Gladwell (2002) encourage similar actions in less socially specific terms. They contend that the success or failure of an innovation lies in the change agent and the means and channels by which s/he decides or attempts to relay the innovation.

"Social Capital and the Diffusion of Innovations within Organizations: The Case of Computer Technology in Schools" (Frank et al., 2004) advances discussion of the diffusion of innovation theory within the field of education. The research and findings may be important to

consider in the adoption and use of technology-enhanced innovations in higher education environments. For instance, the proposed enhancement to the traditional diffusion of innovation theory presents an interesting framework specific to the field of education and demonstrates the need for educational researchers to consider social capital theory in studies pertaining to institutional innovation and development. Throughout the process of study design and implementation, researchers should also ask: To what extent does organizational structure impact the success or failure of technology diffusion? And, of greater importance to this study, to what extent do internal and external policies impact the success or failure of technology diffusion?

Part of the value added by the researchers and research discussed here is the identification of research gaps in postsecondary educational innovation adoption and implementation. To close these gaps, it may be beneficial for higher education scholars and stakeholders to pay attention to lessons and experiences on the uptake and implementation of innovation garnered in the field of healthcare. As some higher education researchers and practitioners have started to delve into healthcare organization- and system-based research, it seems likely that there are lessons that can be applied across both sectors, including: implementation of evidence based practices (EBPs) in public sector organizations; provider attitudes toward EBPs; organizational readiness for change; dissemination and implementation research in various public and private fields; and strategic change in pluralistic organizations (Aarons, 2005; Aarons, Hurlburt, & Horwitz, 2011; Denis, Lamothe, & Langley, 2001; Rubin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008; Weiner, 2009).

To one of Gladwell's (2002) points, and furthering Kania and Kramer's (2011) theory of collective impact, social capital and the resulting social systems demonstrate the power necessary for innovation adoption and implementation, as well as scalable change in education

delivery and consumption. Applied to the current research, the adoption and implementation of educational innovations on university campuses is a Collective Impact Initiative and is reliant on social capital and cohesion development. Given this definition, the researcher hypothesizes that the most successful educational innovations occur within environments where the five collective impact strands are aligned and embedded in the social systems.

Review of Literature Conclusion

As this literature review demonstrates, the unprecedented climate and challenges faced by the field of higher education set policymakers, leaders, instructors, and all stakeholders on a bold and high-stakes path for increased institutional productivity. With the background of fairly uniform and strong public higher education agendas, stakeholders across states and institutions also demonstrate good faith efforts to establish policies and practices to address institutional and student needs. As states and institutions commonly strive to increase higher education productivity, stakeholders often look to technology-enhanced education innovations as means to improve student access, lower institutional costs, and maintain, if not elevate, academic excellence. Technology-enhanced educational innovations, ranging from new institutional models to new models in instruction delivery, offer universities, faculty, and students unprecedented opportunities for growth. However, there remains much to learn about the contexts for adoption and potential impacts of such innovations.

The presented theories provide a framework for readers to understand the various factors involved in unpacking the intersection of policy and innovations within higher education. Policy development in higher education may best be framed by the multiple-streams theory which names conditions, solutions, and politics as the key strands constantly influencing policy

generation. The diffusion of policy innovation theory informs our understanding of policy spread, adoption, and influence. On a state level, these theories offer a sound framework for understanding policy development. On an institutional level, the theoretical framework is quite different. A traditionally modernist field, the proposed study is dually framed by modernism and postmodernism; as modernism remains essential to institutional quality and excellence, the postmodernism concept of performativity is a key concept within national productivity agenda. The focus on technology-enhanced educational innovations then couches the study in a constructivist lens. Finally, to understand how such innovations may spread within a variety of contexts and among many stakeholders the diffusion of innovation theory is supplemented by social capital theory.

This framework helps stakeholders understand how technology-enhanced educational innovations are relied upon and applied within the contexts of the current productivity agenda, as well as the conditions by which higher education policy is created. However knowledge and research gaps exist. The researcher seeks to fill some of these gaps and to take stakeholder understanding a step further by studying how higher education policies intersect and impact technology-enhanced educational innovations—part of the larger question of "why good ideas fail" in relation to technology-enhanced educational innovations. Specifically, this study intends to first add information about how state and institutional policies encourage and hinder technology-enhanced educational innovation generation, adoption, and implementation to the policy and postsecondary development literature base. Second, the study intends to examine how policymakers and institutional leaders can impact innovation uptake and productivity. Overall, the study strives to produce new and valuable knowledge for use and application by practitioners including higher education leaders, administrators, policymakers, and consultants.

CHAPTER III

RESEARCH METHODS

This chapter provides a detailed explanation of the research methods that the author used to carry out the study. The chapter includes an in-depth explanation of the research design, participants, instrumentation and procedures, data analysis, and means for limiting bias and protecting human subjects. The qualitative study employs a multicase study research design. The researcher received Institutional Review Board (IRB) approval at the University of Tennessee at Chattanooga (UTC) prior to conducting the research.

Background to the Problem

The researcher used a multicase study approach to examine the intersection, influence, and impact of institutional and state higher education policy on adoption and use of technology-enhanced educational innovations. "To understand complex programs, it is often useful to look carefully at persons and operations in several locations. The multicase project is a research design for closely examining several cases linked together" (Stake, 2006, p. v). In an earlier work, Herriott and Firestone (as cited in Stake, 2006) conclude that the multicase study approach is especially useful to the study of social sciences and, in particular, policy.

Additionally, the multicase study approach provided the researcher a means of collecting, analyzing, comparing, and presenting information on the institutions and states in individual and comprehensive manners. The study was comprised of three case studies, which enabled the

researcher to gather data and report on each individual case, presented in Chapter IV and a multicase study analysis, enabling the researcher to make explicit linkages across the cases by means of common research questions, presented in Chapter V (Stake, 2006). Stake (2006) explains that each case has its own challenges and idiosyncrasies, but "the official interest is in the collection of these cases or in the phenomenon exhibited in those cases" (p. vi) so that the whole, or the "quintain," in a variety of situations is better understood. Additionally, per Kay (2006), while narrative research is not always recognized as being robust or rigorous, it is often the most useful means of analyzing policy and providing policy intelligence.

Table 3.1 details the intersection of the research questions and theoretical framework, which cuts across the individual case studies to better inform understanding of the whole:

Table 3.1 Research Study Design

Research Question	Theory	Hypothesis	Data Collection	Data Source
How do public research institutions and states develop policies to address higher education productivity challenges?	Multiple-streams model	Fragmented policy development hinders the adoption, implementation and success of solution-oriented educational innovations	Background research and policy analysis; observations and interviews institutional personnel; institution document and state record review	Handwritten notes from interviews and observations, archived data analysis, and interview transcriptions

Table 3.1 Continued

What types of policies or policy amendments do public research institutions and states adopt to address higher education productivity challenges?	Postmodernism; modernism; constructivism	a) Institutions with cultures which value both, and resolutely negotiate the differences between, modernist and postmodernist approaches also adopt policies and apply strategies that support uptake and spread of educational innovations. b) The constructivist challenges of instructor readiness, equitability, and sufficient resources may be key barriers to faculty use of technology-enhanced innovations harmoniously intersecting with institutional policies in public research universities.	Background research and policy analysis; observations and interviews institutional personnel; institution document and state record review	Handwritten notes from interviews and observations, archived data analysis, and interview transcriptions

Table 3.1 Continued

How do successful educational innovations intersect with institutional and state policies?	Collective impact and social capital	The most successful educational innovations occur within environments where the five collective impact strands are aligned and embedded in the social systems.	Background research and policy analysis; observations and interviews institutional personnel; institution document and state record review	Handwritten notes from interviews and observations; interview transcriptions
How do failed educational innovations intersect with institutional and state policies?	Collective impact and social capital	The failed adoption and implementation of promising educational innovations occur within environments where there are missing, or misaligned, collective impact strands.	Background research and policy analysis; observations and interviews institutional personnel; institution document and state record review	Handwritten notes from interviews and observations; interview transcriptions

Population and Sample

To select cases comprising the multicase study, the researcher looked for states and institutions with shared interest in improving productivity through innovative means and with varying political and educational contexts. Stake (2006) proposes the following criteria for case selection:

- Is the case relevant to the quintain?
- Do the cases provide diversity across contexts?

- Do the cases provide good opportunities to learn about complexity and contexts? (p. 23)

Using Stake's (2006) case selection criteria and based on experience conducting site visits to public flagship university campuses and coordinating cross-institutional projects among AAU member institutions, the researcher approached this study as qualitative research based on three case studies for the purpose of facilitating learning and improving understanding the "quintain," including the contexts and means by which postsecondary research institutions engage with technology-enhanced educational innovations. "Multicase study is not a design for comparing cases. The cases studied are a selected group of instances chosen for better understanding of the quintain. Most case study researchers report each case as a case, knowing that this case will be compared to others, but not giving emphasis to attributes for comparison" (Stake, 2006, p. 83).

The selected case studies focused on three of the top American public research universities and their home states—OSU, U-M, and UT Austin. The three case studies represent institutions and states under great political and social pressure, on local and national levels, to improve higher education productivity by economical, impactful, and vastly scalable means. OSU, U-M, and UT Austin are relevant to understanding and characterizing the quintain, the whole of public research institutions. The researcher also selected these institutions and states because their commonalities allow for better analysis across the cases. The case similarities and differences provided opportunities to learn about complex state and higher education contexts, resulting in a greater understanding of the quintain. Case commonalities included institutional membership in the AAU, the leadership role of each institution among American higher education institutions, the leadership role of the institutions as the flagship university within their home states, aspirations for furthering institutional and national excellence, and the expressed

and continued interest of the institutions in collaborating with and learning from one another. A few differences among these cases included the state and institutional contexts, cultures, internal and external pressures, and histories.

Per Stake's (2006) recommendation, the research used similar selection criteria in structuring the individual case studies. The researcher conducted interviews with institutional administration and college leaders, staff focused on improving teaching and learning, and tenure and non-tenure track faculty on each campus. The researcher selected interview candidates based on the criteria listed above, relevance to the research questions, and peer-recommendation. Interview participants were selected based on availability of individuals, diversity of interviewee backgrounds within cases and case groups, and similarities of interviewee backgrounds across cases and case groups. The ratio of interview candidates to interview participants, individuals asked to individuals interviewed, was three to one. In total the researcher conducted 26 interviews, including nine at OSU, nine at U-M, and eight at UT Austin. OSU interviews included two staff members focused on instructional improvement, two tenure and non-tenure track faculty members, one college leader and faculty member, and four campus leaders (three of which came into their administrative position through the faculty ranks and college administration). U-M interviews included one staff member focused on instructional improvement, five tenure and non-tenure track faculty members, one college leader and faculty member, and two campus leaders (both of whom came into their administrative position through the faculty ranks and college administration). UT Austin interviews included two staff members focused on instructional improvement, three tenure and non-tenure track faculty members with one leading a department and two in college administration, and three campus leaders (two of whom came into their administrative position through the faculty ranks and college

administration). Interviews ranged from 30 to 60 minutes and were primarily conducted in person with the exception of four instances where scheduling and inclement weather prevented in-person meetings.

Instrumentation

Prior to conducting all interviews, and in consultation with field and qualitative research experts, the researcher developed interview protocols which included seven open-ended questions. The researcher tested the interview protocol with colleagues external to UT Austin and refined the data collection plan and process during and after this question-testing phase. The ethnographic researcher Sampson (as cited in Creswell, 2007) recommended "the use of a pilot test to refine and develop research instruments, assess degrees of observer bias, frame questions, collect background information, and adapt research procedures" (p. 133).

The researcher used the same interview protocol and question sets for each grouping of interviewees—institutional administrators, college leaders, faculty, and staff—though the terminology was adjusted based on interviewee position. For example, the questions asked of institutional leaders referred to institution-wide goals and strategies and the same questions asked of faculty referred to individual and department or college-wide goals and strategies. A description of the interview protocol is provided in Appendix B. As the study involved research with human subjects, the researcher obtained approval from the UTC IRB prior to collecting any data (University of Tennessee at Chattanooga, Institutional Review Board, 2012).

Data Collection

Data used to inform the study were collected through observations of institutional environments, in-person and phone interviews, and institutional document and state record review. According to Creswell (2007), in a case study approach, the researcher is dependent on multiple forms and sources of data as a means of fully developing the case and accurately conducting analysis. Therefore, the researcher observed as much as possible, including studying records, gathering artifacts, and compiling such information to construct the context for each case. "The case's activities are expected to be influenced by contexts, so contexts need to be studied and described, whether or not evidence is found" (Stake, 2006, p. 27). In-person interviews were conducted during scheduled institutional site visits; phone interviews were also scheduled in advance and only conducted when an individual was unable to meet in-person during the institutional site visit and when inclement weather prevented individuals from being on-campus during the scheduled visit. During the campus visits, in addition to interviewing, the researcher continuously observed and took notes on the various social, political, economic, and situational circumstances that make up the greater case context.

Prior to commencing any interviews, the researcher informed participants "about the purpose, procedures, risks and benefits…the subject's rights in participating in the research, [and] the freedom to decline to participate without any jeopardy" (UTC, 2012, para. 11), asked interviewees to sign an IRB approved consent form, and collected the signed documents. Since the researcher collected data during the interviews via note-taking and audio recording, the established interview protocol enabled the researcher to easily take notes, record environmental observations, and organize thoughts during the interview. Following each institutional visit, the researcher reviewed, bolstered, and edited all notes written by hand. After the recorded

interviews from each institution was transcribe, the hand-recorded notes were added to the transcription files. The researcher worked to ensure that collected information and resulting interpretations were accurate by triangulating all relevant, debatable, and critical data points. The researcher was able to do this by employing multiple research methods (interviewing, observing, reviewing records) and gathering input on such points from interviewees from various groupings (Stake, 2006).

Analysis of Data

The researcher used the analytic methods of qualitative researchers, such as Creswell (2007) and Stake (2006), and methodically conducted individual case analysis and cross-case analysis. To aid in the management of 26 hours of audio-recordings, handwritten notes, and additional institutional and state artifacts, the researcher used Researchware's HyperTRANSCRIBE and HyperRESEARCH software. Following transcription, data was coded into four themes, including structures and frameworks, policies and strategies, processes and practices, and results. Codes were then assigned to data within each theme. Structures and frameworks included the codes culture, climate, education technology models, financing modes, governance model, leadership, and mission. Policies and strategies included the codes collaboration, locally created/driven innovation, university created/driven innovation, resource allocation, institutional policy, state academic policy, and state funding policy. Within the processes and practices theme codes were divided into two categories, barriers and incentives. Barriers included codes such as costs, faculty incentive and support structures, instructor knowledge, institutional or state policies, technologies, and time. Incentives included codes of institutional need, funding, recognition and awards, self-motivation, student need, and faculty

support structures. Finally, the results theme included failed innovations, innovations spurring innovations, instructional innovations, remaining questions, and student reaction/success. Upon completion of the coding, the research used the software to run numerous institutional and cross-institutional reports by theme, code, and multiple codes. The researcher printed each report and through systematic highlighting and organizing analyzed the information and constructed each case study. The case studies are presented in Chapter IV and are organized in a similar fashion to the coding structure, including context, instructional innovations on campus, and policies and strategies.

Role of Researcher in Limiting Bias

The author recognized the following assumptions prior to commencing research: (a) universities and colleges must find and adopt successful, scalable, and replicable innovations—in academics and operations; (b) it is advantageous for universities to approach such challenges through collaborative means; and (c) the current state and national economic and political contexts heighten the need for swift and sustainable higher education productivity improvement. To further explore these ideas, and in advance of creating a study proposal, the author conducted site visits to six public flagship AAU-member universities during which institutional leaders were interviewed about institutional approaches to innovation and productivity. Through such pre-study reconnaissance, the researcher determined there to be (a) commonality among institutional challenges and approaches; (b) differences among institutional approaches rooted primarily in policy and environmental contexts; and (c) a genuine desire among institutional leaders to learn from and about the experiences of peer leaders and institutions.

The researcher limited bias by establishing clear interview questions for each grouping of interviewees prior to data collection. Additionally, the HyperTRANSCRIBE and HyperRESEARCH software facilitated the conversion of interview recordings to text as well as the coding of the converted data and, thereby, significantly limited data transcription and coding bias by reducing human error. Lastly, secondary editors and dissertation committee members reviewed drafts of the research and finding write-ups to check for content clarity, tone, comprehension, and relevance.

Procedures to Protect Human Subjects

Procedures to protect all study participants followed UTC's (2008) IRB policies detailed in the Office of Grants and Program Review "Principal Investigator Training Manual". Participation in the study was voluntary and all interviewees were informed of the study purpose, process, terms, and participant rights prior to signing the consent form (The University of Tennessee at Chattanooga, 2012). IRB approval and participant informed consent was obtained prior to any data collection.

CHAPTER IV

CASE STUDIES

This chapter includes the three institutional case studies, OSU, U-M, and UT Austin. Each case study was developed based on series of interviews conducted with institutional leaders, staff, and faculty, and supporting documentation. The case studies start with a brief overview of each institution before focusing on institutional contexts, instructional innovations on campus, policies and strategies, and concluding thoughts.

The Ohio State University Case Study

The Ohio State University is a public tier one research university located in Columbus, Ohio. The University serves Ohio residents as well as students around the world and has enrollments of nearly 50,000 undergraduate and 14,000 graduate and professional students. The Columbus campus alone serves over 55,000 students, employs over 42,500 individuals including 6,500 full and part-time faculty, and is comprised of 14 colleges offering 168 undergraduate majors and 215 graduate and professional degree programs (Ohio State University, Statistical summary, 2013). The University's size, comprehensive services and components, and 240-plus Ohio-based business partnerships add up to a reported statewide economic impact of over $4 billion each year (Ohio State University, Visitors, 2013). As described in the following case study, university leaders intend to quickly and strategically expand the University's global reach and impact through the development of new online degree and certificate pathways.

To generate this case study the researcher interviewed nine individuals, including two staff members, three faculty members, and four lead administrators. Six interviews were conducted in person and audio-recorded. Three interviews were originally scheduled as in-person meetings, but required rescheduling due to inclement weather; these last three interviews were conducted over the phone and data was captured through detailed note-taking. Observations and outside materials, such as legislative documentation, news articles, and online resources are used to supplement and provide context.

Context

First stated by President Gee in a fall 2007 address to faculty, and noted by all nine research participants, the Ohio State University community shares a commitment to taking "the stride from excellent to eminent, the leap from visible to visionary" (Gee, 2007, para.15). It seems "Excellence to Eminence" is more than just a saying and a shared value; "Excellence to Eminence" is a cultural campaign which focuses the entire OSU community on clear goals and frames the contexts of university operations, practices, and strategic planning:

> In this particular land grant institution, we have to have a really big teaching body because we have a really big enrollment [and] because we want [students] to have access to that education. That's the other big part, we want national and international eminence, more research to solve more problems, to be known as innovators, but we also want to give access to certainly those students in the state (about 75% of our undergrads are from Ohio) and beyond. And, to give them the kind of experience we want we need to have quality across the board and, increasingly, we think we need different types of faculty because not everyone can do everything the same way at all times. (OSU Interviewee 5)

Four university-wide goals strive to translate these aspirations, as well as the institutional mission and vision, into action: (1) achievement of demonstrable excellence in teaching and learning; (2) creating knowledge through research and innovation; (3) supporting outreach and

engagement; and (4) exhibiting effective resource stewardship. OSU leaders have strategically created a foundation for fulfilling these aspirations by way of setting measurable goals, recognizing institutional needs, and cultivating a supportive university culture.

To achieve these goals, as well as reaching and staying ranked in the world's top ten pubic research universities, OSU leaders know the University needs to channel increased and new revenues into the academic core, including recruitment and retention of faculty and students. University leaders have pursued three unique, and sometimes controversial, means for revenue generation including increased commercialization activities around faculty innovations, leasing the management of on-campus parking, and selling century bonds. Revenues generated from these initiatives are directed back to the academic core and focused on supporting faculty, students, and the University's three Discovery Themes of Health and Wellness, Food Production and Security, and Energy and Environment.

To cultivate a university-wide culture amenable to change, stakeholders from across the University have been engaged and integrated in all the strategic planning efforts.

> It begins with academic planning that informs and drives planning for support services such as facilities, human resources, information technology, housing and so forth. To be effective, these planning efforts must engage the entire university in an integrated fashion, from the Board of Trustees to our academic units. (Alutto, 2012, p. 4)

OSU's shared governance system, embodied in the University Senate, serves as another mechanism by which vertical and horizontal integration and engagement of stakeholders occurs. Administrators describe the University Senate as a strong 90-member body comprised of faculty, administrative, and student members, which uses legislative processes to generate, vet, refine, and take action on institutional policies. This structure promotes stakeholder engagement throughout the policymaking process and across all divisions and levels. An example of this

process, provided by a university leader and research participant, is a recently proposed amendment to the university's faculty rules that would allow lecturers and auxiliary faculty members to be appointed for multiple years rather than renewed annually. Prior to beginning work on this policy change, administrators thought and discussed the idea with one another, with Senate members, department chairs, and leadership. With encouragement from departments wishing for increased consistency and security of good lecturers and from lecturers wishing for increased job security, administrators decided to move forward with the proposed change upon completion of the University's quarter to semester conversion. When the time was then right to take up the issue, administrators worked with Rules Committee, a University Senate subcommittee, to analyze potential amendment implications. Committee members conducted interviews and practiced analytical due diligence before sending it to the steering committee, where it ended up a second time following further review by the Faculty Council and the Committee on Academic Freedom and Responsibility. Finally, the policy went to the full Senate for approval and then to the Board of Trustees for a vote. Upon approval, the amendment was written into Board of Trustee code and into the Ohio Revised Code.

As all of the leaders interviewed for this study rose through the ranks of OSU faculty and administration, the principles of the shared governance system was integrated into their day-to-day operations and planning processes. These leaders acknowledge and practice collaboration across levels and divisions as a means to solution determination. For instance, to integrate sound assessment and data-driven practices across all institutional units, the administration did not build an office of assessment, but rather integrated a well-regarded, knowledgeable, faculty member into the Provost's Office.

> One of the things we've done here, the reason there is not an assessment office and the reason I'm from the faculty, is that we felt it needed leadership from the faculty and that

> it not be a stand alone operation. So, we have embedded it in the already established review processes that we think are important and one of those is strategic planning. (OSU Interviewee 4)

OSU implemented a Responsibility-Centered Management (RCM) financial system a little more than ten years ago. Within the RCM model the institution's centers and units are self-funding which, for academic units in particular, means enrollment-driven. The RCM budgeting model has demonstrated a relatively positive impact on the University including increased transparency, strategic alignment of goals and resources, and further integration and cooperation across departments and colleges. An example of the collaboration generated by RCM includes the 2011 creation of the "Life Sciences and Environmental Sciences Networks [which] have helped draw together faculty, graduate students, and others university-wide to advance research and teaching across the breadth of our graduate programs in these areas" (Alutto, 2013, p. 2).

In 2010 to promote collaboration, develop interdisciplinary studies, and reduce operational inefficiencies, five colleges were merged into one—the College of Arts and Sciences. Now the largest OSU college, Arts and Sciences includes 1,150 faculty, 18,000 undergraduate students, 3,500 graduate students, and 2,000 staff. Once the colleges merged, the budgets also merged and the entire college, including all departments and programs, was financially rebased. OSU implements RCM consistently across the colleges but the each college retains the flexibility to develop their own approach to generating resources and expenses as well as aligning allocations with departmental, college, and university goals.

OSU's RCM budgeting model also encourages colleges and schools to collaborate with University administration as is demonstrated in the current administration-driven push for increased distance education offerings.

> The collaborative nature will have to be organic. We cannot hand down an edict that says you will have some distance education courses in your curriculum. We

> can't do that, so we have to continue the dialogue with colleges and say we're here, this is what we do, this why we think it makes sense for you to engage in distance education, but it's really up to you. We changed our [distance education] funding model so that instead of the center keeping the money that is earned from enrollment in distance education courses, it is still the domain of the college. We'll take a little bit more tax off the top to run our organization, but we'll return the revenue directly to the college....[W]hether the enrollments come from traditional on-campus enrollments or from distance education, it's equal in terms of how the money funnels into colleges. (OSU Interviewee 6)

The revised funding model for distance education may spur academic unit openness to, and engagement in, increasing offerings of online educational courses and material. Academic unit collaboration with the University's newly launched Distance Education and e-Learning division within the Provost's Office, will ultimately bolster and possibly accelerate the sustainability and impact of this local technology-enhanced education model.

Leaders created the new division after reviewing the University's policies, programs, and models for distance education and looking for ways to deliver academic programs to people at a distance, reaching a more global audience while also engaging residential students with on-campus digital resources.

> We are developing a robust strategy in which we will focus on niches in which the Ohio State brand has particular value and where long-distance efforts build off our existing strengths. Such initiatives will more effectively integrate our outreach and teaching missions. It will also be necessary to seek innovative ways to use distance education to enrich our existing programs – and perhaps develop new areas of inquiry through a commitment to more sophisticated learning analytics. (Alutto, 2013, p. 7)

Developed through the combination of the on-campus e-learning efforts that were formerly in the Office of the Chief Information Officer with the Office of Continuing Education and the new, never before coordinated distance education effort, the Office of Distance Education and e-Learning launched on January 1, 2013. The office engages the on-campus e-learning efforts,

certificate programs, training programs, and continuing education programs and brings them together under one umbrella.

The sentiment across all OSU research participants is that the University culture is one that encourages and supports collaboration and interdisciplinary work; robust and renowned research; innovation in teaching and learning; expansion of high-quality educational opportunities to new populations; and enhanced experiential learning opportunities for residential students. Within this culture, and as University leaders work to spur technology-enhanced education initiatives across campus, the participants also believe that the local climate for innovation is healthy and supportive. Participants cite current momentum—generated from an internal drive to push the innovation boundaries as well as an external drive of innovative opportunities with organizations and tools such as Coursera and iTunes U—to move the teaching and learning at OSU forward in a more focused, purposeful, and impactful way. At the same time, however, four participants also caution that the climate for innovation on campus may currently be hampered by initiative fatigue resulting from the three-year conversion of the academic calendar from quarters to semesters across the university. This logistical change required the comprehensive redesign of every academic unit's curriculum—program requirements and offerings were scrutinized and faculty had to rethink how they would teach the revised curriculum in shorter classes over longer periods of time.

Instructional Innovations on Campus

The digital education and e-learning organization and momentum on the OSU campus not only focuses on gaining new students and audiences, but also on introducing and making available new learning opportunities to current and residential students. Technology-enhanced

educational innovations used by OSU faculty and students are intended to be fully encouraged, technologically and pedagogically supported, and promoted by the Office of Distance Education and e-Learning. Prior to the creation of the Office of Distance Education and e-Learning, faculty interested in integrating technologies into their instructional methods needed to navigate the University's highly fragmented service centers or be self-reliant and knowledgeable of the technologies, pedagogies, and student needs.

As one interviewee pointed out, the flipped classroom is not a new concept, but it is something that more faculty members are able to integrate into their instructional practices with the help of individually accessible and commonly used technologies. As one interviewee provided example alludes, to flip a classroom requires considerable and pedagogical thought and planning by the instructor and his/her support systems.

Another now widely adopted instructional innovation is the classroom clicker, which was first used as an innovative means of taking attendance in large lecture classes and is now used by some instructors as a key tool for increasing student engagement and targeting classroom time to student needs.

> As soon as we use a polling device or other kinds of interface devices, everyone is in a position where they are saying 'I don't understand why we're not doing this all the time' and that's the real take away for me as a teacher. The students just don't like it, they're saying 'That was valuable to me, I want to do more of that'" (Ohio State University, OSU Faculty Perspectives on Teaching with Technology, 2013).

The implementation of labs in the College of Nursing changed significantly in the past ten years with improvements in the strategic integration of simulation technologies.

> Basically we have these computerized mannequins and they cost anywhere from $30,000-$200,000 a piece and they do things like have pulses, blood pressure, blink, pupils dialate/constrict, they breathe, they have a monitor you can put an EKG up [of] vital signs, you can put an IV in them, catheter, make them pee, all of that. We can program the mannequins to any physiology we want—we can

> pick a diagnosis or a multiple diagnosis, even use a case study of a patient. We then design a scenario—a script—of how the physiology starts and changes, expected behaviors of the students, and then we will run small mock clinical situations. So we will have our students in small groups and they play the nurse and we play the patient, we set up the room so it can be an apartment or anything up to an ICU environment, and we [the lab staff] will play the part of a patient. So we do about 500 of those sessions a year—every student goes through one per semester, maybe two, and the experience is related to the content of the particular course. Since we just went semesters, I'm thinking we do simulations every semester except for the first. We've incorporated a simulation experience into every course. (OSU Interviewee 3)

The College of Nursing simulation lab staff collaborate with clinical faculty to build and revise each case so that the students experience a real-life problem aligned with their classroom work. Lab staff strives to provide students with as many simulation experiences as possible before they graduate. The lab director also coordinates inter-professional simulations so that students have the opportunity to learn and experience another professionals' scope of practice.

> We're realizing that a lot of our hospital errors are related to miscommunications. So, it's not so much that I'm a great nurse and you're a great physician, but if we can't communicate that's not going to help the patient. If I'm making the decision as a nurse, but I'm not the expert on dietetics, or whatever it might be, I'm not going to be able to make the most informed decision for our patient. Through the interprofessional simulations we are teaching our students how to work in a team. So far, the simulations have been phenomenally successful, the biggest challenge is logistics. (OSU Interviewee 3)

With support from an innovative Dean, the self-motivated and creative lab director initiated and coordinated the collaboration of faculty from physical therapy, respiratory therapy, medical dietetics, medicine, acute care nurse practitioners (graduate program), undergraduate nursing, and pharmacy. The faculty representatives teamed up once a month beginning May 2012 and built two cases that met the needs of all participating disciplines. The cases were run two at a time in a series of 20 two and a half hour sessions over a three-day period. They were successful experiences in that they added value to the students' learning and to the curriculum in each discipline. The lab director plans to run similar inter-professional simulations twice a year and

expects it to continuously evolve—the next iteration will include social work; each patient will have a social history with referrals, and possibly occupational therapy.

Another example of an instructional innovation resulting from a motivated and creative instructor is the development of delivery systems for online general chemistry materials. Motivated by personal experience, a lack of student readiness for college level chemistry, and a gap in rigorous chemistry courses offered in high schools, two years ago a lecturer and undergraduate student started working together to video record introductory chemistry class lectures with the intent of posting them YouTube for general consumption. The lecturer's project, to create a course that could be handed directly to a high school teacher or student, snowballed from there so that now most of the content is developed and ready for packaging and hand-off. At the same time, this work positioned the lecturer to take advantage of the University's underused iTunes U platform where the general chemistry course is posted and used by 113,000 learners from around the world.

Though the chemistry course materials were produced as an individually-driven project, stemming from a motivated individual with technological knowledge and resources, the project also fed information and momentum into to the University's Digital First initiative. A precursor to the Office of Digital Education and e-Learning, the Digital First initiative was based in the Chief Information Officer's office and focused on helping faculty integrate technology into classrooms for the purpose of engaging and preparing students with 21st-century learning and workforce skills. Through dedicated resources for integrating technologies and instruction, including staff and Impact Grant funding opportunities, the Digital First reach includes expanded iTunes U offerings as well as iBooks creation and iPad implementation (Ohio State University, Digital First, 2013).

University leaders believe today's technologies and opportunities for innovation, coupled with institutional support from the center, will form the necessary frameworks for access, teaching, and learning improvement. As one administrator states:

> I'm a firm believer that as technology has an impact on how people access information, how they weave technology into their own learning experiences, that we [OSU] better keep up with that. I feel that we have a significant level of expertise here at Ohio State and it's a shame that we require students to actually be resident on our campus to take advantage of that level of expertise. So the impetus was to actually, two things, change the way we interact with our residential students and to open our reach beyond the boundaries of our state and our county. So the only way we could do that was through a concerted effort to engage students and, at the same time, change the curriculum so that they could take advantages of the new innovations in technology. Figure out how to take the lecture we've been giving on our campus and convert it into a technology world. Convert is the wrong word, you can't just convert courses, you have to in many ways change courses. (OSU Interviewee 6)

Although the Office for Distance Education and e-Learning brought many ongoing technology-based University efforts together, the early galvanizing initiatives of the division include the first OSU foray into the delivery of MOOCs through the Coursera platform—instructional innovations not even on the radar of university leaders when they were first making their online learning plans. "In the process of putting this together, suddenly the MOOCs swoop in and show what they have planned—tip their hat a little bit—in the sense that we had to engage to make sure we were at the table for some of those discussions, so that we're not on the sidelines" (OSU Interviewee 6).

The University has five Coursera courses scheduled. The first course, Calculus One, launched in the spring 2013 semester and currently enrolls almost 33,000 students from 127 countries. It is taught by a lecturer who is, as described by research participants, young, energetic, and technologically savvy. Approved in December 2012, the lecturer, supported by the Digital Education and e-Learning office, built and launched Calculus One in January 2013.

The course being an instructional innovation alone, the lecturer also designed and is delivering content via Mooculus, a custom e-textbook and learning platform where students can enroll, watch lectures, read the text, and do the work (Ohio State University, Mooculus, 2013).

University leaders and engaged faculty plan to learn from this current work and to continuously improve the content and instruction as the technologies evolve and their knowledge deepens. Not only would faculty like to improve the lecture video viewing capabilities, they also intend to embed learning analytics into the courses so correlations between work and student performance can be made and instruction improved. University leaders see this energy around and rapid development of open educational resources as mechanisms for continuous improvement and as means for personalizing student learning on campus, improving college completion rates, and reducing student debt.

Policy and Strategies

Based on the provided examples, some key incentives for faculty adoption and implementation of technology-enhanced educational innovations include self-motivation, institutional and leadership support, student need, external pressure, and a collaborative environment. Such incentives drive classroom innovation; certain university policies, at the local and central administration level, and state policies may influence these incentives and, thereby, innovations.

At the local level, the merger of the five colleges into one College of Arts and Sciences provided leaders with an opportunity to collaboratively review and assess every policy and practice of each college, including promotion and tenure and teaching loads. Faculty were brought in on every issue, leaders convened individual meetings with program chairs and

directors, and 20-30 town hall style meetings were held to include additional faculty and staff in the conversations. Through this change management process, including one to two years of fine-tuning, the policy and strategy results will be determined. Simultaneously, the strategic planning process is a mechanism for college leadership to implement innovation through shared ventures, such as the Center for Decision Sciences, and common policies, like cost sharing and team teaching. Through this planning process, college administrators intend to take, modify, and apply the best practices based on their affordability and potential impact, through embedded group implementation.

The central administration may also use the strategic planning process as a mechanism for instituting and revising policies and procedures. For instance, rather than running assessment processes and practices through a separate office, university administrators have embedded it into review processes such as strategic planning. College strategic plans are submitted to the central administration and reviewed by a team, where each member focuses on a particular aspect, before ultimately being reviewed by the Provost and Vice Provost. The administrator leading the University's assessment initiatives serves as a member on each team and reviews each unit's teaching, learning, and assessment driven decision-making processes.

> We've embedded our assessment through the curriculum process. It's curriculum assessment because we learned very early on that the two areas where you're most likely to improve learning in a program is through changes in the content and curriculum or in your instructional delivery methods—that's your distance education for example. (OSU Interviewee 4)

This process of embedded assessment may eventually have an impact on the implementation and continuous improvement of instructional technology-enhanced innovations. Currently, as one faculty member cautions, many of the innovative tools and delivery platforms in use do not

include or embed assessment and so it is difficult to gage the pedagogical strength and quality of instruction.

> I read an article the other day talking about an instructor who went to a conference and everyone at the conference had Macbook Airs. The author was saying we have to treat the MOOCs like the PC Notebook—you can buy a notebook for $250 but everyone is paying $1200 for the Macbook Air. Why? Because it's better—it's the quality. In the MOOCs you have an enrollment of 100,000 but 5,000 students are getting through the course. Those 5,000 students could probably be taught in any way—the instructor could say go read this book and they would and they would pass the class. So you have this small subset of students getting through each MOOC, what about everyone else? If I suggested, or taught a class with a 5% completion rate, that wouldn't fly. But with the MOOC it can. So no one has risen to the top to say here is the quality standard of what online education should look like, here are all the bells and whistles, here is a course that is pedagogically driven. If we're just going to take lectures and throw them online, that's not pedagogically sound movement. What we need to be able to ask is how do we improve content? How do we identify those aspects of the course that need to be improved by another medium? (OSU Interviewee 1)

As the University continues to take a more strategic and comprehensive approach to integrating technologies in the classroom, embedded assessment would likely influence the use of and reliance upon such teaching and learning tools, just as it does for traditional instructional methods.

In 2009, university faculty, student, and administrative leaders, through the forced collaboration and debate imposed by the shared governance system, vetted and adopted the University System of Ohio recommendation for all universities and colleges operating on a quarter-based academic calendar to transition to a semester-based academic calendar which was outlined in it's 2008-2017 Strategic Plan for Higher Education. The transition to a semester based system was recommended by the Regents as a means for generating "[t]he success of students, the integration of institutions, and opportunities to improve efficiencies and trim costs" (Ohio Board of Regents, University System of Ohio, 2008, p. 48). According to The Ohio State University Board of Trustee April 2 and 3, 2009 meeting minutes, the University Senate

approved a resolution to adopt a semester calendar on March 12, 2009 as the University supports an integrated system of higher education in Ohio and the semester calendar "facilitates employment opportunities for graduating students as well as student research, international study, internships, service learning, and other specialized learning experiences for undergraduate and graduate students" (Ohio State University Board of Trustees, 2009, p. 722). The adoption of this resolution launched the University on a three-year calendar conversion process in which all programs underwent review.

> [E]very single major, minor, graduate program, undergraduate, masters, and Ph.D. program had to be looked at to figure out: Do you have all the same courses? Do you change some of them around because they have different credit hours? What do you really want to require? A lot of units used that to completely change a whole major, get rid of courses, add courses, think about what made sense. (OSU Interviewee 5)

The three-year process included this local review and analysis process which was followed by a presentation of each plan to the Office of the Provost run Committee on Academic Affairs.

> There was a lot of innovation in it. There was a lot of thinking about what students really need; a lot of thinking about outcomes and assessment. We were doing the calendar conversion largely to make sure all the public schools in Ohio were on the same calendar, in part so that students could transfer from one school to another, but certainly another benefit of it was that it gave a time table for every unit to think about and assess what they were doing. (OSU Interviewee 5)

For example, College of Arts and Sciences administrators and faculty overlaid curriculum for over 8,000 courses and through this comprehensive process of program review and analysis new programs such as the neuroscience degree, which already has about 300 student majors , were created. The recalibrating of priorities and requirements and the restructuring of program delivery frameworks fostered innovation in terms of resource allocation and development across all academic units.

Promotion and tenure policies also fall within the local and central administration jurisdictions. Similar to most large public research institutions, budgets are constrained and in such an environment strategic resource allocation is often top priority. This is true for the whole institution, each college and academic unit, and each faculty member.

> It doesn't fit with public opinion, but faculty are caught between so many worlds and more and more is demanded of them. For instance, if you want faculty governance you have to run the university but if you're running the university are you doing research too? Or, if you're doing research and have a lab with 20 researchers, are you in the classroom and focusing on improving instruction? (OSU Interviewee 4)

Often faculty engagement with course redesign, distance education, and e-learning efforts is not taken into consideration during promotion and tenure review. "We have to engage faculty in those discussions. They are not policies that are currently changed but we know they are policies we have to take a look at" (OSU Interviewee 6). Research participants indicated momentum for changes to promotion and tenure policies and faculty rewards structures is building at both the faculty and leadership level.

In line with the shared governance system, the process of determining policies regarding faculty promotion is very decentralized. There are 109 tenure-initiating departments, schools, or colleges, and each, by faculty rule, has an Appointments, Promotion, and Tenure document that outlines the criteria to gain tenure and become a full professor. Amendments to those criteria take place at a local level, sometimes in collaboration with faculty across the unit but sometimes not, and are approved by the department Chair, then Dean, and finally by the Provost.

> In this case of changing criteria, I think we can describe it as a process that is top-down and bottom-up. In the sense that we had a vision, really originally articulated by the President in a speech to the faculty, of saying that we needed to be more flexible about rewarding faculty for doing what they were really doing and doing very well, especially when they are making a national and international impact, and that there ought to be more flexible criteria. He put that out there as a talking point. And people talked about it for a while and in meetings with Chairs,

> we meet with all Chairs at the same time. So it was kind of trickling down and it was reiterated by the Provost and a couple of speeches to the Senate and reiterated at various points by leaders. But, then the real work of doing it was when a Chair of a department would say OK, we're really ready to do this and we're going to go talk as a faculty (because it's really peer driven) because they needed to talk about what would count, what it really meant for their field, what it meant for their significance of the field nationally, and once they did that they could rewrite it and it could come back up for approval. (OSU Interviewee 5)

Faculty, staff, and administrator research participants expressed their beliefs that the faculty rewards structures and professional expectations must more strategically align with the values and priorities of the institution, their unit, and their discipline. As one faculty member explained:

> I have the luxury of being a lecturer. I don't have to do research. I can focus all my time and effort in teaching and I've worked on that very hard and passionately over the past few years. But, if I had research hanging over my head and that was going to get me promoted and going to get me all this stuff, my focus would be a completely different story. (OSU Interviewee 1)

Furthering this point, the University as well as the academic units are pressured by external influencers such as "U.S. News and World Report" which takes only research, not teaching, into account in their nationally published and highly regarded rankings.

Another university policy that surfaced across the nine interviews was the RCM, enrollment-based, funding model, which now includes distance and online education as well as traditional residential enrollments. As noted, this funding model provides institutional support and incentives to the academic units engaged in distance and online education. Intellectual property policies also intersect with certain technology-enhanced educational innovations. Currently under review and consideration by faculty and university leaders, the question of content ownership acts as a barrier to faculty engagement in the creation of new courses and materials. In terms of royalty, mobility, and professional credit, removing intellectual property policy barriers is critical to comprehensive adoption and engagement. But, "it's like the

mimeograph, in practice does it matter? In a digital and open courseware environment in practice, does it matter" (OSU Interviewee 8).

Beyond strategic changes at the institutional level, research participants also noted state-level policies that intersect with technology-enhanced educational innovation implementation, including requirements for high school dual credit, expectations for dual credit/enrollment instructors, the potential revisions to the high school core curriculum requirements, and limitations on institutions providing remediation. Currently, in Ohio, in order for students to earn dual enrollment credit the person who teaches the course is required to hold a master's degree in the specific subject area. This stipulation, credited for the maintenance of course rigor, limits the number of dual credit and enrollment courses that may be offered to Ohio students. This is particularly troubling for fields of study which require rigorous and time consuming master's level work, such as chemistry.

> It's not like you can just take a couple of classes at night and get a master's in chemistry. You have to write a research based thesis. I don't know what percentage of high school teachers in the state of Ohio have a master's in chemistry, but I don't think it's very many. They would have to take off work for two years, come back to graduate school, complete two years' worth of research, be a TA, and then publish a thesis. So, while the dual enrollment idea has promise to improve student readiness and graduation, it might be hard to execute. (OSU Interviewee 1)

Though this policy does not directly impact innovation implementation in the classroom, it does impact the preparation, knowledge, and skills students bring with them when they enroll in college. To meet students' academic needs, particularly in introductory level courses, instructors may be more apt to use technology-enhanced educational innovations that allow for delivery of rigorous, yet tailored, curriculum and content. OSU's introductory chemistry class and the innovations deployed to reconfigure the design and delivery of the course content provide a good example of how this state policy can influence instructional innovation.

Currently, the revisions to the state's high school core curriculum, college readiness standards, and higher education funding formula are moving through the state legislative process. Revisions to the state's high school graduation requirements and college readiness standards focus on reducing the need for academic remediation and developmental education at public higher education institutions. The uniform statewide standards for remediation-free status as established by the presidents of Ohio's public colleges and universities, as required by law, set the foundation for statewide secondary college readiness standards. The proposed revision to the high school core curriculum may also significantly impact universities and colleges in that the Governor intends to ensure that most institutions at the university level are remediation free.

> In other words, most of the four-year institutions in the state will not receive state subsidies for remedial courses taught. Financially, that could have a big impact on a number of departments that, in the past, were using remedial courses to get their students ready to take courses taught as part of their majors or taught in support of other colleges. (OSU Interviewee 4)

Technology-enhanced educational innovations may be the answer to both the student's needs and the financial gaps faced by certain academic units. Through creative use of MOOCs, learning objects, information packets, and technology-based tools, academic units may provide students with remediation assistance that fill any academic readiness gaps while shrinking the number of students in non-credit bearing courses.

> The example I use is the engineering student who has trouble in differential equations but is doing well in all other parts of that mathematics curriculum. That student can take advantage of a MOOC that is focused on differential equations, or a learning object, or some other tool as supplement the instruction. (OSU Interviewee 4)

The Ohio State University Case Study Conclusion

OSU is a decentralized institution operating with strong shared governance and traditional RCM finance systems driven by a collective commitment to take the university from

excellent to eminent. Research participants describe an endlessly energetic institutional culture with a supportive and positive approach to innovation and experimentation while simultaneously describing a fatigued institutional climate primarily due to the recent conversion from a quarter to a semester academic calendar.

Faculty are experimenting with and adopting technology-enhanced innovations across campus. University leaders and faculty are learning from such experiences and experiments and are working together to create a model for supporting technology-enhanced innovations in classrooms. The intent of the recently launched Office of Digital Education and e-Learning is to financially and pedagogically support faculty and academic units with technological experimentation and adoption through consultative services, grant awards, instructor recognition, and barrier removal. This office will also serve the University as a hub for engagement with external partners and opportunities and advancement of OSU's worldwide reach and service.

Specific instructional innovations, such as OSU's first course delivered through the Coursera platform and flipped classrooms using web-based simulations, demonstrate that adoption and implementation of technology-enhanced innovations in the classroom is possible and is happening. Such examples also highlight points where such innovations bump into traditional higher education paradigms as well as institutional and state goals. For example, promotion and tenure policies traditionally do not incentivize faculty to invest in their instruction or to experiment with innovations in the classroom. Concurrently, university leaders recognize technology-enhanced instructional innovations can help them fulfill institutional goals of reaching new populations and addressing institutional needs such as providing additional academic support to underprepared students. Through the Office of Digital Education and e-Learning, OSU seeks to establish an institutional foundation and model for supporting

innovation within traditional systems and capitalizing on new opportunities on the path toward eminence.

The University of Michigan Case Study

The University of Michigan, one of Michigan's two flagship institutions, strives "to serve the people of Michigan and the world through preeminence in creating, communicating, preserving and applying knowledge, art, and academic values, and in developing leaders and citizens who will challenge the present and enrich the future" (University of Michigan, Office of the President, 2013). To fulfill this mission, the University has 19 schools and colleges, almost 3,000 tenure or tenure-track faculty, and 4,700 non-tenure track faculty to serve approximately 27,500 undergraduate students and 15,500 graduate and professional students through teaching, learning, and research opportunities (University of Michigan, Office of Budget & Planning, 2013). The U-M Ann Arbor campus economic impact includes over $2.6 billion in expenditures and $3.1 billion in revenue for fiscal year 2012, according to the Business Leaders for Michigan (2013).

The following case study, focused on the Ann Arbor campus, is based on information gathered through nine interviews, observations, and supporting documentation. Interviewees included three staff (or non-tenure track members), three tenured or tenure-track faculty, and three university leaders. Eight of the interviews were conducted in person, on campus, and audio-recorded; due to scheduling conflicts, the ninth interview was conducted via phone and data were captured via note-taking. Observations and outside materials such as legislative documentation, news articles, and online resources are used as supplemental materials allowing for a deeper, more detailed, dive into various case study aspects.

Context

In January 2013, U-M was ranked on Edudemic's list of the top "10 Innovative Universities Shaking up Education" (Edudemic, 2013). Although U-M maintains a long history of success in innovation, teaching, and research, faculty and campus leaders maintain that the crippling impact of the early-21st century recession on the State of Michigan has fostered an on-campus climate of urgent responsibility and an even stronger desire to drive reinvention through inventive human capital, innovations, and efficient operations.

> We do feel like we have a responsibility to the state, and the state desperately needs to reinvent itself. You know the old auto industry? It's now coming back but due to innovation in manufacturing. We need to help reinvent the state and that in large part means helping develop students who are innovative, that is one thing. The second is, the financial pressures of the recession cause us to be more innovative in the way we do our business. (U-M Interviewee 4)

University leaders strive to improve (1) academic excellence, (2) access and affordability, and (3) resources and strategic resource allocation. Academic excellence refers to priorities such as maximizing opportunities generated by globalization, spurring entrepreneurship, integrating the arts, and addressing global challenges. According to one college leader, the state's financial crisis also heightens the college, department, and faculty focus on similar priorities such as student enrollment, student success, faculty instructional development, and strategic resource development and allocation.

To accomplish such goals within the University's highly decentralized governance and RCM finance models, U-M administrators lead by (1) example, (2) influence, and (3) the strategic use of resources. The Provost, a mathematician and recipient of the U-M Excellence in Education Award and a Thurnau Professorship, emphasizes the importance of excellent teaching by continuing to teach while holding administrative appointment.

> The message is that we want to be leaders in the educational mission. That is something we are committed to at the institution. One of the reasons the Provost is teaching is because he doesn't want anyone to come to him and say they are too busy to teach. He's teaching and he's the Provost – no one is busier than the Provost. (U-M Interviewee 7)

The Provost also demonstrated use of influence in early 2012. Following successful efforts to extend the maximum allowable tenure probationary period to 10 years, he issued a memorandum to deans, directors, and department chairs encouraging recognition of entrepreneurial, creative, and outreach activities in the review of promotion and tenure cases.

> These activities may enhance any of the criteria on which faculty are measured – teaching, research, and service. They may include involvement with other sectors of a sort that has not traditionally been considered in faculty evaluations, or they may include creative activity that does not take the form of traditional scholarship.... Such activities strengthen the University and should be considered as contributions worthy of consideration, both at times of tenure and promotion and on an annual basis. (Hanlon, 2012)

Possibly as a result of this memorandum, or of a culture reinforced by this memorandum, one faculty participant recalled:

> I received some good mentorship in that people recognized that I was working in a new space, that was risky in terms of the tenure process, but I was advised to figure out ways to quantify the impact of what I was working on. So, I started working with the students to publish some of their work in other outlets and to engage with professional organizations. I had to get involved in creating venues for publishing the work or doing things that appeared more traditional and…simultaneously doing nontraditional things like teaching in nontraditional ways. (U-M Interviewee 5)

College leaders, faculty, and staff research participants also highlight the University's culture of entrepreneurialism and innovation, fostered by a supportive climate composed of systems and resources dedicated to experimentation in the colleges and classrooms. Although most cite this as a culture and climate with roots deeper than the present contexts, the participants also allude to an amplified entrepreneurial environment due to structured services, such as those provided through the Center for Research on Learning and Teaching (CRLT) and

the use of targeted grant competitions. CRLT, a Provost-led unit serving all 19 colleges, works on behalf of the administration "to promote a university culture that values and rewards teaching, respects and supports individual differences among learners, and encourages instructional environments in which diverse students can learn and excel" (Center for Research on Learning and Teaching, 2009, p. 2; Cook & Kaplan, 2010). CRLT provides campus-wide resources such as workshops and consultations, as well as services customized to meet the needs of the individual graduate students, faculty, and academic units. One example of this is CRLT's collaboration with the College of Literature, Science, and the Arts on the development and implementation of the Teaching Academy, a required workshop and year long program for all new faculty, focused on instructing and supporting faculty on how to teach and excel as instructors.

> Really we lay out the expectations of the College in regards to teaching....It's one of the most important things we've changed. This is the first time, keep in mind since they got their Ph.D.'s that someone said you are going to be good teachers....This first person who talks to them about teaching has to say that it's important because their colleges won't necessarily. So, that's where we got the idea for the Teaching Academy—the first person they were going to hear about teaching from was going to be the College leaders and CRLT. (U-M Interviewee 8)

Through the CRLT, the Provost's Office also runs a variety of instructional grants and awards ranging from one-time $500 awards to year long $15,000 awards. A few of the instructional innovations discussed in the next section, such as screencasts and the E^2Coach system, resulted from such grants or were widely recognized through the Teaching Innovation Prize. Two new strategic resource distribution initiatives of the President and Provost Offices include the Third Century Initiative (TCI) and M-Cubed. TCI is a five-year, $50 million set aside aimed at framing and generating excitement around innovative, multi-disciplinary, teaching and research approaches as U-M approaches its 2017 bicentennial. M-Cubed is one of the

programs launched under the TCI umbrella and focuses $15 million on seeding numerous two-year, high-risk/low-stakes, interdisciplinary research projects. The program, an idea generated by an engineering faculty member, spurs faculty to work with two other faculty members with whom they have not previously collaborated. The M-Cubed awards are up to $60,000, or $20,000 per faculty member, and are awarded on a first-come, first-serve basis. As of January 2013, 177 M-Cubed projects were funded with most proposals coming from engineering and other science programs.

Encouraged and supported by University administration and driven by financial pressures and mechanisms, the U-M academic units operate with aligned priorities of student success, excellence in teaching and research, and strategic budgeting. Building on the University's momentum, the colleges have built local systems to accomplish goals and incentivize excellence in teaching and research. Faculty participants from various disciplines discussed the support that College leaders provide in regards to local and campus-wide collaboration, the creation of local formal and informal hubs for innovation, and opportunity to experiment with innovative and student-centered instructional methods. For example, faculty participants discussed one Dean who not only speaks about fostering innovation and improvement, but also matches any CRLT grant awards that faculty receive with academic unit appropriations. Another example includes a Dean who regularly and explicitly encourages faculty to try new instructional methods in their courses and to not worry about any change-related dip in evaluations. The University and academic unit priority alignment generates a campus-wide culture of collaboration, experimentation, and shared values.

> I feel that to the extent that I've been a good teacher here, it's been due to having really good colleagues to talk to, to work with, to use their work as a starting point so I don't have to reinvent the wheel every time I walk into a class. Part of the institutional culture leads to adopting new things—it can't just be the University

> saying if you want to try new things, go ahead, we won't stop you. It has to actively be solicited and good teaching has to be recognized. Everybody would rather be told they are doing a good job, and thanked for it, rather than labor away in obscurity. So, I feel that has been a really positive feature of this University. (U-M Interviewee 6)

The U-M governance and budgeting systems drive responsibility and practices to the local level, however the apparent horizontal and vertical alignment of priorities and values creates a system of shared values and a means of efficient innovation-development. It is through this complex system of coordinated decentralization that the University seems to effectively balance and successfully maintain the public flagship institution's mission of preeminent teaching and research.

Instructional Innovations on Campus

U-M's highly decentralized governance model also steers the university to a highly decentralized model for education technology dissemination and adoption. Most of the technology-enhanced educational innovations used by U-M faculty and discussed below are driven at the individual and local level. Primarily spurred by a combination of self-motivation, student need, financial resources, and institutional support structures, all the U-M faculty participants demonstrated an overwhelming level of comfort and confidence in their ability to experiment with instructional practices and technology-enhanced instructional innovations and to improve their overall instruction.

Examples of self- and student-motivated instructional innovations include faculty members use of, and research on, frequent student feedback, screencasting, and tailored tutoring. In the first example, after teaching an introductory course for a few semesters a faculty member was troubled that some students understood the content while others did not. After consulting

with CRLT, the instructor started to poll the students at the end of each class and ask one thing they understood and one thing they did not. Though the feedback was helpful, the size of the class made it difficult to re-engineer the content to suit the needs of all students.

> Video screencasting was just coming online, this was pre-Khan Academy, so I decided to make these little videos like Khan Academy and put them up on the course management website and allow the students that wanted the resource to access it. (U-M Interviewee 3)

In collaboration with a colleague in CRLT, the instructor started to look at the data collected on student access, use, frequency, time, etc. The individual course project ended up being a point of research that the instructor was interested in pursuing— which students were using these technology-enhanced tools and were they benefiting from using the tools? What the instructor and her colleagues found was that students who had not seen the exact material previously, many of whom were taking the course as a technical elective or as a course outside of their major, benefited the most.

> They come in with the same kinds of GPAs [grade point averages], SAT scores, ACT scores, there's no reason why they shouldn't do well but, historically, they didn't do well. So when we started launching these videos these same students were able to join the pack. They didn't become the best students, but they are average and caught up. (U-M Interviewee 3)

This is not the first time screencasting has been used at U-M, or even within the department, but the instructor was able to look at the results in a statistical way and determine significance and then publish her results.

College leadership and CRLT noticed the instructor's innovative instructional methods and pursuit of research, and recognized him/her with a Teaching Innovation Prize.

> Also, this work generated a forum for the College and the School of Education to talk about the importance of having people from the school of education doing research on higher education and specifically STEM because the national science foundation has been pushing that lately. So they are saying and putting out more calls for investigating student learning. From that point of view it is on the

> national radar and our departments have recently been successful in having a joint hire—there is now a researcher at the college of education whose focus is on student learning in our College. (U-M Interviewee 3)

Going forward, the instructor would like to continue down this line of research and look at the impact of technology-enhanced instructional practices college-wide.

In another example, faculty from a department on the other side of campus was asking similar questions about its students, particularly those in the large introductory courses. A few faculty members recognized that as soon as a student enrolls in a course the instructors, in principle, know a lot about that student, including demographics and academic history. The interested faculty asked: "What are the predictors? Which of these many things we know about the students correlates most closely with how they are likely to do in [this introductory] class" (U-M Interviewee 6). Looking at the data, the faculty found the strongest predictor of success in the class was the student's U-M GPA. A student's approximate course grade would be their current U-M GPA minus half a letter grade. These findings raised more questions. One of the interested faculty members continued the research and specifically focused on trying to understand what tools and strategies the students who did better than expected, across a range of letter grades, used to beat the prediction. The faculty member collected additional data through interviews and focus groups with students, generated a robust data set, and then, using a public health technology-enhanced educational tool geared toward smoking cessation, developed E^2Coach. The E^2Coach system asks students to voluntarily take an online survey about their strengths, weaknesses, goals, time commitments, etc. at the beginning of each semester. Then throughout the semester, the students receive tailored video and written advice.

> Starting with the beginning of the semester advice of not falling behind and doing your work. But you know we have a prediction for how they're going to do, and then they take an exam at the end of the first month. Well, we have a prediction and we have a statement about how the students want to do then they take the first

> exam and maybe they get eight out of 20. Then the system knows about that and maybe they get further feedback after the first exam and sometimes they're asked questions and advice like: 'You know you said you wanted to get a B- in the class, you got 8 out of 20 on the last exam which puts you at risk of not getting that, here are some things you should consider doing or changing...'. We can't make students act on advice, and sometimes the advice isn't perfect, but it's the kind of thing you would say to the student if they came to your office. We've had these conversations over and over and over with those selected students who take the time to come to our office. This is a way to reach out to everybody and give everybody the benefit of our own experience and that of fellow students who have been in the same boat and figured out how to bail the water out. (U-M Interviewee 6)

The E^2Coach system was conceived by a small team of tenured faculty members interested in improving student success. It was developed and tested by these faculty members with two stages of the University's Whitaker Fund for the Improvement of Teaching awards, and is now in the process of being scaled across introductory courses in other disciplines with the support of National Science Foundation (NSF) funding. Similar to the previous example, these faculty members were self-motivated and driven by student need, encouraged by the University with financial resources and demonstrated support for exploration and experimentation, and they grounded the work in research, thereby also generating research outputs.

One non-tenured faculty member working on the expansion of E^2Coach plans to use the tool in place of a less-personalized, less-sophisticated learning object currently used to remind students what they should be doing to prepare and be successful in the course each week. The instructor, one of U-M's first five Senior Lecturers, oversees Statistics, one of the largest introductory courses on campus. The current course enrollment of 1,800 students is divided into five lecture sections and 62 lab sections that meet for one-and-a-half hours each week and are run by 34 graduate student instructors (GSI). Through a network of internal and external support systems, the instructor seeks to continuously improve the means by which the course content is delivered to, and received by, students. In addition to grant awards from the University through

CRLT and Instructional Support Services (ISS), the instructor is working on the third year of a College of Literature, Sciences, and Arts grant program, the New Initiatives/New Infrastructure (NINI) grants.

The NINI grant program, Michigan Education through Learning Objects (MELO), is an interdisciplinary group focused on finding, evaluating, and integrating learning objects into large gateway courses. Over the three-year grant period, the group has expanded to include eight disciplines and includes the creation of online learning objects such as pre-lab materials, interactive syllabi, and web-based exercises. "It's really helped me expand my knowledge and what I was bringing to my class in terms of enhancing it with the right technology that would enhance the experience for the students in the right ways" (U-M Interviewee 9). To personalize the learning objects, faculty and GSIs working on the project bundle many of the learning objects with short videos to situate each tool for increased student understanding. The collection of objects is built as a repository available on the online platform Open.Michigan, a "University of Michigan initiative that enables faculty, students, and others to share their educational resources and research with the global learning community" (University of Michigan, Open.Michigan, 2013, para. 1). Parts of the collection have also been submitted to the Multimedia Educational Resource for Learning and Online Teaching (MERLOT), "a free and open online community of resources designed primarily for faculty, staff and students of higher education around the world to share their learning materials and pedagogy," to help a larger community of educators, colleges, and organizations improve in similar ways (Multimedia Educational Resource for Learning and Online Teaching, About Us, para. 1).

Integration of such tools in the classroom is not something that happened quickly, for this instructor it is an evolving process.

> Teaching the way I teach hasn't changed much just in terms of the interaction in the classroom. In a lecture hall with 300 students, how can I get them to interact? So the interactive notes were one of the first things that I brought in and made available for the other instructors. So methods are tweaked....I've been working with the publishers to allow me to use certain pictures and put them in my notes and keep them on Open.Michigan. The workbook and how labs are conducted have evolved. I was one of the first faculty members using clickers because a publisher asked me to try them. So I tried them with my e-MBA class; then I tried them with my spring term class when I didn't have quite as many students. Then CRLT and ISS were interested and wanted to know how that was going; then the University was considering investing in clickers and I served on the panel. So, I was one of the first to use clickers and I continue to use them but in different ways. When we were over in another building we had mailboxes in the basement and students would drag their homework over and drop it in our mailboxes, now it's online. I don't even know if we need a textbook any longer— we're moving away from that. Every exam question has a video solution now and we've gotten great feedback on that, or less complaints about exams because they see and hear the solution and process immediately. These are things that are all part of the overall package of what I do in the class but it wasn't all there. It's the productive struggle. (U-M Interviewee 9)

The instructor highlights important characteristics of the uses and evolution of technology-enhanced innovation integration in the classroom. The "productive struggle" may be used to describe process of student learning, as well as the process of instructional improvement.

A final example of instructor driven innovation supported locally in the college and externally by the U-M hospital and Microsoft, is the transformation of the senior-level capstone course in software engineering. A non-tenure track faculty member with 20 years of experience working in industry oversees the design and implementation of the project-based course. In this final course students take before entering the workforce, the instructor strives to provide them with an experience that simulates industry and has social relevance. Over the past six years, the course has evolved to fill a niche collaboratively identified by the instructor and students.

> Then around three years ago one of the student groups worked on an iPad app for sending and receiving texts and emails for people with cerebral palsy. They built this iPad app and this thing really received a lot of national and international attention. It's one of those things where students would work on projects, and they were wonderful efforts but they were somewhat contrived and then at the

> end the semester it was a pat on the back. That project was hugely successful. The students that were in it had an opportunity to form a company rather than go work for the companies they had already said yes to. Five of the students went and worked for the companies that they said they would work for and one of them stayed and formed a company of his own and continued development of this project. So, over the period of the summer we all scratched our heads and said 'We hit a home run and we didn't even know we were playing baseball.' (U-M Interviewee 2)

The impact of this project, on the students and the end-user, transformed the design and implementation of the course. Now the project-based course introduces students to a new technology and a disability and challenges them to work together in teams to create new solutions to health challenges. According to study participants, the University, primarily through CRLT support services, college leadership, and local support structures such as the Center for Entrepreneurship help to create the space and mechanisms for such in-class experimentation and instructional risk-taking.

University driven technology-enhanced educational innovations include the almost countless results from the competitive and non-competitive funding opportunities made available to faculty. As noted, the M-Cubed program awarded 177 proposals as of January 2013, and the TCI totals $50 million in dedicated resources for the instructional enhancements and improvement. U-M, a founding Coursera partner with four courses launched and three with dates pending, plans to learn from the institution's engagement with MOOCs to not only forward means of delivering education but to also improve the quality of education for residential students.

> MOOCs are fine but much more important is how can you use online lectures with embedded assessment to compliment what you learn in class? Forget massive, but other ways you can take some kind of the lecture out of the classroom and thereby free up time to do more hands on engaged kind of learning experiences with your students and/or expand the number of students each faculty interacts with because they are not having to do all the lectures. That is where the role of higher ed administration should be. (U-M Interviewee 4)

A different type of university-driven initiative is the relatively recent conversion to Google as the University's email provider.

> We as a campus moved to Google as a provider of email as part of a very large IT rationalization process. We are a very decentralized campus, more so than most, so we had all these different servers and all these ways people were getting email and it was a mess. So they decided they are going to scrap all that and they looked at various providers and chose Google. (U-M Interviewee 7)

Along with the email service, Google Apps are available for campus use. To prevent many of these tools and opportunities for instruction enhancement from being forgotten or perpetually underused, CRLT and the instructional technology services (ITS) created a faculty learning community to discuss and explore possibilities for integration of the apps in instructional practices. CRLT provided small demonstration project grants to the participating faculty to experiment with various apps and followed up each project with faculty interviews, a project brief, and the Provost hosted a well-attended, half-day seminar which included learning objective based panels to promote information sharing among faculty. Overall, the roll-out and promotion of Google apps was successful:

> Some people that had never used [technology] before that started using tools such as blogs, the scheduling software, and Google docs for a variety of purposes. There was a faculty member who travels a lot and started using Google+ hangouts for office hours – the nice thing about that is that you can share screens and you can have multiple students online at the same time or set up appointments to hang out. Not only were [the faculty] very creative, but they loved talking to their colleagues about it. They loved meeting other faculty. (U-M Interviewee 7)

Even with a university-wide initiative, such as the implementation of Google applications in the classroom, University-driven innovation is carried out by centers such as CRLT and ITS through channels and strategies that match the decentralized and willingly collaborative culture of U-M.

Policies and Strategies

Factors for faculty adoption and implementation of technology-enhanced educational innovations include self-motivation, student need, financial resources, institutional support structures, and a conducive environment. Such factors drive instructional innovation; certain university policies, at the local and university levels, and state policies may influence the campus culture and faculty incentive to innovate.

U-M's RCM financing model furthers the decentralized governance system in that each college and academic unit is self-supporting and driven by student enrollments.

> When you are handed a budget form from the Provost's Office and it says 78% of your budget comes from undergraduate tuition, that's a wake-up call for the importance of that effort in your College. By the way, this is true for everyone [college leaders]. So basically, the manifestation of revenue and expenditures in the RCM almost compels universities today to be much more serious about their undergraduate teaching and experience (U-M Interviewee 8).

Therefore, this financing model directs colleges and units to focus on capturing and retaining students. Academic units work to bolster the importance of, and the stature related to, high-quality teaching. One example is the required year-long Teaching Academy for new faculty members in the College of Literature, Science and Arts. Another example of this are the college- and university-level awards such as the Excellence in Education Award, the Teaching Innovation Prize, and the Arthur Thurnau Professorships, all of which provide good instructors with deserved recognition, additional motivation to innovate, and support while also elevating the value and importance of good teaching across campus.

> More and more of the top administrators at the Deans level and at the Provost level are really committed to teaching. Our Dean of the College of Literature, Science and Art is a Thurnau Professor— that is the top award for teaching on campus. Our Provost is a Thurnau Professor— he was involved in calculus reform and he still teaches calculus as Provost. And there has been a consistent message about the importance of teaching. (U-M Interviewee 7)

U-M's financing model and awards structure, coupled with the University's strategy of incentivizing instructional innovation through competitive and non-competitive grant programs generate a culture that values teaching and engages in experimentation. Over the past couple of years university and college leaders have worked to better align promotion and tenure policies with the University's innovative spirit and ambition. As noted, in 2011, University leaders led efforts which resulted in an extension of the limit of the possible tenure clock set by governing faculty at each academic unit from 8 to 10 years. A controversial amendment, the process for making the change required faculty governance leader signatures which in turn would then allow the Regents to open up the tenure policy. Other objections cited by the "Ann Arbor Chronicle" on April 25, 2011 included opposition from the Senate Advisory Committee on University Affairs, the faculty governance body, which raised concerns that the prolonged period would only increase the workload of junior faculty and potentially prolong the time it takes to make promotion and tenure decisions. Upon hearing from seven faculty with various perspectives and campus leaders, the Board of Regents voted in favor of the change. According to campus leaders, this change does not dictate, but does allow for, increased department flexibility and space for individual risk-taking.

Almost a year following the Regents vote to extend the tenure clock, the Provost issued a memorandum to academic unit leaders— deans, directors, and department chairs— explicitly encouraging academic units to recognize the entrepreneurial, creative, and outreach value added by individuals in the evaluation of promotion and tenure cases. While only an expression of encouragement, University leaders noted this memorandum did receive wide circulation. Already, the promotion and tenure criteria are and continue to expand "[i]n fact in all our promotion and tenure cases across campus we explicitly ask about interdisciplinary work" (U-M

Interview 4). The expansion, however, is not just a broadening of criteria—it is also an increase in expectations.

> Keep in mind, everyone is talking about research. The problem is not the department socializing people to research, the problem has been departments say do the best you can with your teaching but it's irrelevant. That's been the culture of the research university. That's what we're changing. We're changing it from irrelevant to balanced...The expectations for teaching went up; the expectations for research didn't change. (U-M Interviewee 8)

University leaders strive to create a culture of innovation and work to provide space and opportunity for faculty to engage in that culture, but such allowance is not at the expense of traditional measures of quality.

Beyond internal local- and university-level policies, a few research participants noted state funding and high school college readiness standards as two policy levers influencing university instruction and operation. Similar to many states, U-M has recently withstood often unpredictable and declining appropriations for public higher education. In Michigan, following fiscal year 2010 with an across the board cut of 0.4% and a fiscal year 2011 cut of 2.8%, fiscal year 2012 included a harsh across the board 15% funding cut to all public institutions. Funding started to swing the other direction in fiscal year 2013 with U-M receiving a 2% increase and the adoption of a revised state performance funding model. The most recent Governor's budget proposal for fiscal year 2014 indicates U-M could receive a 1.1% increase in state appropriations.

> The increase for operations is distributed using the performance funding formula adopted in the fiscal year 2013 budget, providing long-term planning stability to state universities. The metrics used are: weighted undergraduate completions in critical skills areas, research expenditures, 6-year graduation rate, total completions, and administrative costs as a percentage of core expenditures. (University of Michigan, State Budget Information, 2013)

Though such increases do not make up for the preceding years of declining state support, some university leaders project that the improving fiscal climate may positively impact the ability of individuals to innovate by providing the institution with increased revenues that can either directly support instructional innovations, create a more stable culture in which faculty can take risks, or relief financial pressures elsewhere and indirectly provide academic units and faculty increased flexibility. Other participants, however, feel that it may be too early to be considering such fiscal improvements stable, much less game-changing.

In 2010, the State Board of Education adopted the Career and College Ready Common Core State Standards (CCSS) as the new k-12 mathematics and English language arts standards. Accompanying the adoption of the CCSS the state also signed on as a state partner in the Smarter Balanced Assessment Consortium, which received federal funding to develop assessments based on CCSS. The new assessments could replace the current state assessments beginning as early as Spring 2015. Until implementation of the new assessments occurs, student performance will continue to be assessed based on the former standards. Recently, the Michigan Education Department released promising news regarding the current standards and assessments:

> The [Michigan Merit Exam], which includes the ACT college entrance exam, showed increases in the number of students scoring proficient or advanced in four of the five subject areas tested since 2007, including reading, writing, mathematics, and science. The largest increase occurred in writing, increasing from 40 to 47% between 2007 and 2011, followed closely by a math increase from 46 to 52%, science from 56 to 61%, and reading from 60 to 63%. (Ackley, 2013)

Though state reports indicate more Michigan students are graduating high school prepared to succeed in college, faculty participants, particularly those in the STEM fields, stated concern for the academic skills with which student are entering U-M. The question therefore remains: will the pending changes to the state's k-12 core curriculum and assessments shrink this

misalignment of secondary and postsecondary expectations? Should it do so, faculty across all Michigan universities may have the opportunity to transform their courses, specifically introductory courses, in ways not previously possible.

The University of Michigan Case Study Conclusion

U-M is a decentralized institution operating through shared governance and RCM financial systems with a campus culture rooted in innovation generation and a climate driven by internal and external expectations for the university to lead the state out of the lingering recession. Study participants, leaders, faculty, and staff, commonly described a sense of individual and institutional responsibility to advance the university, and thereby improve the economic state of the state, through human capital development as well as internal and external innovations.

To meet these institutional and state expectations within U-M's decentralized systems, campus leaders continue to seed a culture of innovation and experimentation through low-stakes grant programs, innovation prizes, and faculty accolades. Colleges further this culture in a variety of ways such as the College of Literature, Science, and Art requiring new faculty to participate in the instruction-focused Teaching Academy and the College of Engineering leaders promoting entrepreneurship, innovation, diversity, and experiential learning. Faculty supported through such mechanisms and motivated by student needs and self-interests are creating, experimenting with, and learning from technology-enhanced innovations across campus. For example, faculty members from various departments in the College of Engineering have worked with the college's Center for Entrepreneurship and CRLT to redesign courses and reinvent student's learning experiences. Additionally, faculty members from the physics department

teamed up to personalize student's learning experiences and statistics instructors use technology-based learning objects to continuously reinvent the delivery of introductory statistics.

Within the decentralized governance structure, the institution's intersection of such instructional innovations and institutional policy primarily occurs within the strict RCM financing system and promotion and tenure policies. The enrollment driven RCM model incentivizes academic units to attract and retain high numbers of students and, according to one campus leader and faculty member, this means the college must also attract and retain high-quality instructors to deliver the highest-quality instruction. Campus leaders also recognize that promotion and tenure polices traditionally run counter to incentivizing instructional investment and improvement and have started to build a foundation for these evaluative practices to include considerations for creativity, innovation, and entrepreneurship. The depth and breadth of U-M's innovative culture and instructional practices may be a direct result of the institution's decentralized systems in that ideas and innovations are locally-owned but institutionally recognized and that campus leaders focus on removing barriers to innovation as oppose to building support structures for innovation.

The University of Texas at Austin Case Study

One of Texas' two public tier one research institutions, the University of Texas at Austin's main campus for undergraduate, graduate, and professional studies sits on forty acres, five blocks from the Texas state capitol building. UT Austin works to:

> [A]chieve excellence in the interrelated areas of undergraduate education, graduate education, research and public service ... [and to contribute] to the advancement of society through research, creative activity, scholarly inquiry and the development of new knowledge. The university preserves and promotes the arts, benefits the state's economy, serves the citizens through public programs and provides other public service. (University of Texas at Austin, About UT, 2013)

The UT Austin community includes seventeen colleges and schools, nearly 40,000 undergraduate students, 12,200 graduate and professional students, almost 2,000 tenure and tenure track faculty, and 1,125 non-tenure track faculty.

Information included in the following case study was collected through eight interviews, observations, and supporting documents. Interviewees included two staff members, three faculty and department or college leaders, and three campus leaders. All interviews were conducted in person; data were captured through audio-recordings for six of the interviews and note-taking for the remaining two interviews. Supplemental documents such as transcripts of public addresses, legislative documents, news articles, and online resources enabled the researcher to compile a more detailed depiction of case study elements.

Context

The UT Austin fiscal year 2013 operating budget of almost $2.35 billion is greater than the previous fiscal year due to increased revenues from tuition, grants and contracts, philanthropic gifts, and the University's endowment. State appropriations account for 13% of the University's operating budget, down slightly from fiscal years in the immediate past and down 52% since 1981 (UT Austin, Budget 101, 2011; UT Austin, Office of Information Management and Analysis, 2012). In light of this fiscal climate, University leaders take a steadfast approach to continuous mission-driven improvement through strategic generation and allocation of resources, transparency in leadership, and shared governance through a moderately decentralized system. Internal finances are determined and distributed based on a customized RCM budgeting model, the Deans/Provost Academic Core (DPAC) process, where University

and academic unit and center leaders meet yearly to jointly review and agree to five year budgets and unit goals.

The 2004 report issued by the Commission of 125, a group of 218 stakeholders that convened in 2001through 2002 to outline a 25 year vision for UT Austin, set the University on a course to achieve a "higher standard of excellence" in the first quarter of the 21st century through two strategic initiatives and 16 recommendations (UT Austin, The Commission of 125, 2004, p. 30). Implementation of the Commission of 125 vision began under former University President Faulkner and continues with current campus leaders who focus on student academic experiences and successes; shared university governance and strengthening of academic unit leadership and faculty engagement; and the development of strategic internal and external networks.

The Commission of 125 formalized the University's student-success centered culture by spurring new institutional goals and recommending broad and specific practices to meet those goals. A few years later in 2007, the Policy Advisory Committee found UT Austin lagged behind its peers in resource allocation to direct and indirect faculty and student support. In April 2012, to build on the work of these earlier groups, UT Austin President Bill Powers commissioned 13 business leaders to form the Committee on Business Productivity. The Committee's purpose was to review UT Austin's business operations and make strategic recommendations for improved practices and increased efficiencies. Amid increasing governance questions and pressures from the UT System, the Board of Regents, the Governor of Texas, and the Texas state legislature, President Powers released the Committee's report, "Smarter Systems for a Greater UT," and announced the University's commitment to strategically implement the recommended practices for improved system efficiencies and a strengthened academic mission.

In a January 29, 2013 speech, President Powers provided an overview of the University's current fiscal contexts, touching on the purpose of the study and the Committee's recommendations, and committing the university to continued strategic improvement:

> As we all know, we're going through very tough economic times, in the State, in higher education, and here at UT. We've just been through a protracted recession that has tightened state funds for our university, state funds that were already at historic lows as a share of our budget. The recession has constricted our investment income, and it has made development a greater challenge. And certainly, it has affected families trying to send their children to college. The Texas economy is doing a lot better now, and certainly it has done better than the rest of the country. But we still see dramatic effects on our campus. We still have to be very creative on how we use our resources to move the University ahead. I'm so proud of this campus for the way it's responded to these challenges. We've made huge changes. Let's remember that we've already cut $47 million *a year* out of our budget. It's been painful, but we've done it. But as I've often said, the work of reform is never done. As people in my faith say, we are "reformed and always reforming." So we must always continue to look for ways to save money. (Powers, January 29, 2013, para. 4)

The recommendations resulting from the Committee's work included the consolidation to a shared administrative services model in certain transactional areas; improvement of asset use through the conservation of energy and strategic market-based approaches to some auxiliary operations; streamlined licensing processes; and consideration of organizational structures to spur an increase in the campus' entrepreneurial culture. Conservative projections indicate smart implementation of these recommendations could yield nearly $500 million in savings over a 10 year period and, although not every recommendation will result in reform, University leaders believe that the "recommendations represent the direction that we need to go" (Powers, January 29, 2013, para. 23).

University leaders intend to use the resources generated from the implementation of these recommendations to strategically invest in the academic core and to carry out the earlier recommendations of the Commission of 125 and the President's Policy Advisory Committee.

The goal most frequently cited by study participants, to increase UT Austin's four-year graduation rate from 52% to 70% by 2016, must be accomplished through a reconstitution and realignment of university-wide practices and processes. The "Moneyball" philosophy that campus leaders have adopted promotes the regular practice of analyzing resource deployment and constantly focusing on movement of the "big rocks"—undergraduate students, graduate students, faculty support, and diversity (UT Austin, Interviewee 6).

Campus culture continues to move toward "focusing on students as individual cases with individual needs" and transforming operations to heighten educational experiences delivered to, and accessed by, students (UT Austin Interviewee 2). As one participant surmised, there is also a need for greater stakeholder recognition of and commitment to the unique value added by public research universities, like UT Austin, to the student development:

> Things like MOOCs or the University of Phoenix replicate an awful lot of what we do,...[but] there are some things that we do here [at UT Austin] that aren't part of the University of Phoenix or MOOC model. We are here with the students for four years, at a very pivotal part of their lives. We do a lot of helping students grow up and helping students find themselves. That's a pretty good reason to have a campus and I'd like to make sure that what we achieve really enhances that part of that argument of why we're here....I'm happy to teach a [University of] Phoenix course, that's the easy part of being a college student. The hard part of being a college student is being an independent innovator and that really is what we're doing here. That's why you students come here and pay to come here—to learn to be that innovator. (UT Austin Interviewee 5)

To facilitate and support the instructional approach that Interviewee 5 describes across campus, UT Austin leaders are working to build internal and external networks and partnerships where instructional innovations can be discovered, implemented, and sustained. UT Austin leaders initiated the development of two consortia of partner institutions, one in Texas and one of the national public flagship institutions, to build a networked community of institutions which allows all participants an increased ability to "get out in front of innovation in a scalable and

systematic way" (UT Austin Interviewee 6). The University's internal approach to spurring campus engagement with instructional innovations started with the launch of the Course Transformation Program (CTP) in 2010-2011, where faculty were encouraged to apply for Provost Office grant awards to redesign lower division gateway courses "incorporating innovative approaches to instruction and learning" (University of Texas at Austin, Course Transformation Program, 2012a, para. 1). After successfully funding six projects, three in the College of Natural Sciences (CNS) and three in the College of Liberal Arts (CoLA), University leaders are taking and applying lessons learned from the program and working with an outside consulting firm to develop a new internal governance structure around technology-enhanced education. Proposed changes include the reconstitution and reallocation of current University resources to drive collaboration among, and increased capacity across, the colleges and academic units. Some of the key areas to be navigated in the development of the model include support and incentive structures to foster increased faculty engagement with technology-enhanced educational innovations; integration of assessment strategies; pedagogical and technological support structures; and strategies for integrating new course delivery and access models into traditional university systems.

One of the first initiatives within the new technology-enhanced education governance structure is a robust Faculty Fellows program. Based on consultations with peer teaching and learning centers at peer institutions, University leaders decided to develop internal mechanisms to foster faculty engagement with, and creation of, instructional innovation and improvement. Still in the planning phase, university administrators are developing a program with a representative collection of faculty fellows from across the colleges with a negotiated program of work.

> Objectives for participating faculty include (1) teaching consultations with faculty in their college, (2) projects to identify and disseminate effective teaching practices in their field, and (3) initiate and lead programmatic work in their college to support teaching and learning. We plan to implement the fellows program by gaining from the college buy-in by providing participating units with financial resources; gaining buy-in from the faculty fellows through recognition as excellent teachers and financial resources, and not requiring a one-size fits all model but instead to negotiating what works best for individual faculty in their individual local-level contexts. (UT Austin Interviewee 3)

UT Austin's leaders are working to put systematic and sustainable structures in place so that technology-enhanced educational innovation is centrally and locally driven. The ultimate goal is to create a university-wide space for, and culture of, instructional improvement and innovation generation.

Instructional Innovations on Campus

While the University works to instigate a campus culture open to innovation and experimentation, CTP served as the initial administrative pass at prompting the improvement of classroom instructional practices. The CTP provided the financial resources and structural support needed by faculty in CNS and CoLA to turn their ideas for innovative instruction into practice. CTP investment and support enabled the redesign of the introductory biology, general chemistry, and statistics courses and included data analysis of various success measures in these science courses. This data analysis was used as a means to advance CNS administrator and faculty goals to improve student success in freshman year; to decrease the number of students dropping out and transferring to alternative colleges; to shorten the time it takes UT Austin students to earn a degree; and increase the number of students who successfully complete a degree and enter science and health professions. For example, general chemistry was redesigned as a hybrid course which integrates web-based learning modules, delivered by the homegrown

Quest course management system, to allow for increased flexibility in instructional delivery inside and outside the classroom.

> This inquiry learning which will be achieved through exploration of research data, classroom demonstrations, and presentation of material in the context of everyday life and other disciplines....The hybrid course will also allow for future development sections of general Chemistry with a particular topical focus (energy, health sciences, materials, etc.)" (University of Texas at Austin, Course Transformation Program, 2012b, para. 6).

A CNS statistics faculty member describes the course redesign project with CTP as an opportunity to put into place advanced instructional practices and learning mechanics that the faculty knew were needed to improve student success. The key, however, is that the faculty teaching the redesigned statistics course do not view it as a finished product. Instead, faculty describe an ongoing cycle of constantly tweaking the course to make it better and to provide students with improved tools for data analysis, collaboration, and stacked learning opportunities.

The culture and climate of CNS seems to parallel, if not pre-date, the University's student-success centered mission and practice focus. Since the early- to mid-1990s, CNS leaders and faculty generated programs such as UTeach and Freshman Research Initiative (FRI) programs now modeled across the UT Austin campus and state lines. UTeach was started in 1997 as a means of increasing the number and preparation of secondary teachers in the science, technology, engineering, and mathematics fields. Though there were many institutional policy and practice hurdles, including a regulation that there is only one teacher certification entity on campus, the UTeach initiative was eventually integrated into the fabric of CNS and transformed experiential learning for hundreds of students. UTeach is now implemented in 35 universities across the country.

Similarly transformational for student's learning experiences, the FRI program offers first-year students the opportunity to engage in research in chemistry, biochemistry,

nanotechnology, molecular biology, physics, astronomy, and computer sciences. It was created to help students entering into the sciences quickly develop an accurate understanding of what it means to be a scientist and what it means to conduct research.

> It's really where you experience being a major in that area. A chemistry class, well that's the chemistry of the 1700s but now it's in a textbook and we make sure everyone knows it before they go on to do research. So a lot of the push toward more experiential learning is to get students involved in faculty led research right away, in freshman year. That's a big change because students are use to getting cookbook labs, very traditional lab experiences, where they discover the things that were discovered in the 1800s. Well, we're trying to move away from that and instead involved students in a faculty-led research project during their freshman year....The program that was set up is a research methods class followed by students going off to work in faculty research labs under the supervision of postdocs or research educators. So, that's a big shift and we're starting to see [it happen] more because it's a better mode of instruction for a lot of our students that came into the sciences because they wanted to get involved in research. This is a better way of getting students excited about, and prepared for, the field they're going to take on in their professional careers. (UT Austin Interviewee 5)

Technology-enhanced educational innovations help faculty to more easily flip their classrooms, teach more students, and reallocate resources to allow for higher-quality faculty/student interactions and experiential learning opportunities. Courses that may have ordinarily enrolled thirty students can, in a flipped model, enroll 130 students; lecture material can be delivered online, while class time can be spent on small group work and problem solving. The redesigned general chemistry course is only one example of an adopted flipped classroom in CNS, and across the University, and though it has worked well it is not viewed as revolutionary nor is it viewed as the end game.

> Where I think we're heading is personalized learning paths. Right now, it's watch a video, read some text, take a quiz. But, imagine if I watch a video, I take a question and based on my answer to the question I could either be sent to a link, to the video, or to another question. We can use technology to give students different prompts and paths to achieve the learning outcomes. That's not where we are, but it's where we're headed. (UT Austin Interviewee 8)

College faculty and leaders believe that student participation in small learning communities and research as an undergraduate results in greater academic success as well as a greater probability of on-time graduation, obtaining a post-graduate degree, and using faculty as a reference.

> The administration and faculty of this college did a lot of work to make every student feel like they are part of a small learning community. Because it's an 11,000 student college it's important to not make them feel like they are one face out of 11,000. They have to have 20 or 30 people that identify them as a team— their cohort or their friends— and that took on a lot of different faces in different programs. (UT Austin Interviewee 5)

Adherence to these principles has thereby resulted in transformed classroom instruction and student academic experiences throughout the college.

Influenced and supported by the CNS's efforts to transform the student learning experience, the Texas Interdisciplinary Plan (TIP) is a collection of academic programs that creates a small college experience for a cohort of diverse students coordinated across the Colleges of Natural Sciences, Liberal Arts, and Education. Students selected to participate in TIP exhibit a range of risk factors that traditionally create a barrier for success at UT Austin. TIP students engage in a rigorous curriculum that is supported by highly trained advisors, mentors, and faculty in a small learning community.

In addition to the CTP and college-wide efforts, academic units across the University are in the process of reviewing degree program offerings in relation to student academic and professional needs. A department with CNS currently undergoing reorganization will result in the consolidation of three current degree programs and there is a lot of discussion and negotiation among faculty to determine what students really need to gain from their academic experiences and to succeed professionally.

> I think we're striking a balance between meeting the needs for the students that have been defined by the faculty in terms of different content types of exposure that they need to have along with an appreciation of what college more broadly is supposed to mean. So, now we are in the midst of trying to redefine a degree program for students that takes into account the thousands of students that come into our college that do not necessarily desire career scientists either in academia or in a lab but love science and will find a career, one of the many new careers that pop up every day. (UT Austin Interviewee 1)

CNS leaders and faculty are in the process of redefining a bachelor's degree program with an interdisciplinary focus, built-in flexibility, and certificate-resulting tracks for students. "Again, it's the sense [that] the time is right. There is change in the air, so let's jump on board and take it for a full ride" (UT Austin Interviewee 1).

Seven years ago, two CoLA Introduction to Psychology instructors started to rebuild the course so that it would build on both of their strengths and save each of them time. Today, these faculty members spend much more time on designing and implementing the course, while continuing to team-teach and transforming their instruction delivery. Over the years of teaching together, these faculty members iteratively reworked their instructional practices to generate more frequent student-instructor feedback and more personalized learning opportunities for students. In 2011 with college and university-level technological and financial support, the faculty were able to take the course redesign to the next level.

> To CTP's and CTL's (the Center for Teaching and Learning) credit they were very generous, and the College of Liberal Arts was incredibly generous. The CTL programmer worked all summer and got it working. Our liberal arts colleagues, they were all on board and all really helpful because we had all these WiFi experts and server people who were helping us deal with really large parts of the system and we got it to work. There were some bumps at the beginning, but by and large it worked well. We were able to do everything that I told you. We didn't do much of the chat stuff, but we did a lot. The testing system worked really well; the surveys worked really well; and students got feedback immediately after each class. We changed the whole course—dynamics are so different in a class like that and students didn't like it much at first. Oh, we also did away with the textbook and used materials online including Wikipedia sites, relevant websites, commercial sites occasionally, research articles, New York

> Times. This is a really different way of teaching which also freed us up from the tyranny of textbooks and the tyranny of students having to pay $170 for the textbooks. We also used Ted talks and YouTube and so forth. (UT Austin Interviewee 4)

While students did not support all the changes, the instructors found that their students performed better in subsequent courses, insinuating that students learned how to learn in the introductory course and that based on a system of classifying students by their parent's degree attainment, student achievement gaps were reduced.

> In our [2011] class they were only 0.4 letter grades apart, much lower in their other classes both in the fall and in the spring. In other words, we were reducing the traditional achievement gaps. Those findings were stunning to us. It had never occurred to us that would happen and we ended up being so wildly excited just by the promise of a method like this that could really bring about profound changes in the way people think about a course. So, this last fall, this was really adopted heavily by liberal arts. (UT Austin Interviewee 4)

In the next academic year, the Introduction to Psychology instructors decided to teach one course section just as they had they year prior, and to also teach one online. After a couple of weeks of adjusting the course delivery, and realizing the stand-up lecture did not work online, the instructors effectively taught 1,000 students in "tvland."

> We're calling this a SLOC - a synchronized large online course. Kind of like a MOOC but a SLOC—our class ended up having 870 students. The idea worked well but we also had a lot of technological bumps. Our programmer left in the last month and we had a lot of problems with the video in the first month. But we also learned so much about the social dynamics of a giant class—it's a really different way of teaching. (UT Austin Interviewee 4)

The faculty, college, and University continue to learn from the experience of teaching this course, and the faculty intend to build the course so that next year it can be offered to 2,000 UT Austin students and up to 10,000 external students. This would mean that two faculty members could essentially teach all UT Austin Introduction to Psychology students thereby allowing peer instructors to focus their attentions elsewhere. Such growth will also mean a heightened demand

for psychology teaching assistants—more than are available—and new strategies for instructing tens of thousands of students effectively in small learning communities online.

> We cannot talk to 10,000 students on a personal level; we cannot provide the same kind of personalized feedback. How do you do it? How do you set up communication among students? This was a big problem that we had with this class. You can't have just one string because you have 10,000 people—it's like a mob. You need to break up the class into smaller pods. We're going to have to change—once we do this we're essentially going to have to build a bureaucracy. (UT Austin Interviewee 4)

Despite the challenges, the instructors and college leaders "are wildly excited" by the promise of a method like that this that can bring about profound changes in how courses are constructed, delivered, and consumed (UT Austin Interviewee 4).

In addition to financial awards and investments, such as the CTP grant awards, the University provides pedagogical and technological support to faculty implementing innovative instructional practices through CTL. Leaders are now using the CTP experiences to inform the development of the University's technology-enhanced educational governance structure and adapt supportive practices "along the continuum of the clinical teacher and the practical teacher" (UT Austin Interview 3). In fall 2012 the University announced, UT Austin will be leading the implementation of the UT System's Institute for Transformational Learning (ITL) partnership with edX. That November, the Provost's Office put out a call to faculty for UTx proposals and received 23 inquiries from across campus. Through a formal proposal selection process, including faculty presentations and small group meetings, UT Austin plans to launch four courses on the edX platform in September 2013 and nine courses total in the coming academic year, 2013-2014.

Policies and Strategies

The Commission of 125 report continues to frame UT Austin's institutional improvement policies and strategies most notably through the creation and establishment of heightened goals and the convening of task forces to accomplish these goals. For example, the task force on undergraduate graduation rates concluded their work with 60 recommended strategies to increase the University's undergraduate graduation rate to 70% by 2016. Currently, UT Austin's four-year graduation rate stands around 52%, but the four and half-year graduation rate is 70% and the five-year graduation rate is 75%. Therefore, although the University's goal of increasing the four-year graduation rate to 70% may seem like a major statistical jump, it is attainable by means of reducing the number of semesters 20% of the student take to graduate by one. Due to the shared sense of immediacy and the alignment of the goal among campus leaders, development and implementation of related policies and strategies impacted all units and stakeholders across campus. First-year orientation was reinvented and is now required; greater focus and investment has been placed in student advising; and campus administrators have created mechanisms so that they may make better use of available student data. Beyond report recommendations, study participants described an evolved campus culture in which the University's teaching and research mission is balanced with student success core to institutional success.

> People ask me how are you going to raise your graduation rates and I say, that's easy, one student at a time. It's scripture—it's lost sheep and you find them and bring them back and then that's what you do. I hate the notion of numbers. I hate that we just look at the probation rates of students we move into the [School of Undergraduate Studies] and its 20% probation rate for fall, higher than any other school on campus. How dare we?...We can at least ask what can we do with that group of students so that next year it's 6%. I'm working on structure to make that happen....It's looking at all the pieces on the field and figuring out how to bring them all together in ways that would fit and do the best for the students within the available resources. You have to understand human nature; you have to understand all the pieces. (UT Austin Interviewee 2)

Though policies and strategies continue to develop and improve, initiatives such as the creation of the School of Undergraduate Studies, the core curriculum reform, investments in instruction via CTP, and investments in the strategically building frameworks to support technology-enhanced education demonstrate the commitment of UT Austin leaders to accomplishing their major goals by supporting innovation and work at the core.

Faculty incentive structures, however, do not always foster instructional innovation and improvement. It is important to note, as one staff participant cited, that almost every time an instructor changes a course, student course evaluation scores decrease typically due to misaligned student expectations of what it means to be a learner, a passive recipient of information versus an active recipient and creator of information.

> At a very simple level, the clearest example of college-level policies influencing our work is that many departments have developed or are developing a minimum course instructor survey (CIS) requirements for their teachers. CIS scores so you have to get a four or above—if you're a lecturer you might not get your contract renewed, if you're tenured you might not get a merit increase, if you are not yet tenured then tenure might be on the line for you. Some departments, I don't know colleges, but some departments have those requirements. So I know that's a policy that drives people resources like CTL but not in an inspired manner. That's a stick, not a carrot. (UT Austin Interviewee 3)

Institutional and college-level policies and strategies traditionally do not remove instructional innovation barriers like lack of time and technological knowledge, nor are resources always in place for departments using lecturers to teach large section courses. Additionally,

> [T]he actual incentives for teaching improvement are not in place yet on our campus. We have some awards—we have the regents awards and some other awards that are given for excellent teaching—but at a research one university teaching is not as valued and our culture is as such that teaching is not as valued as research. So, when it comes to promotion and tenure the faculty are not incentivized to improve their teaching. (UT Austin Interviewee 8)

UT Austin leaders and staff recognize these incentive misalignments and are working to develop strategic internal and external partnerships around innovation to figure out how to

allocate resources, to internally increase support structures and faculty resources, and to work on better alignment of budgeting and incentives.

> For instance, right now the resources and incentives don't align. In introductory courses, mainly lecturers, the pay is low and the teaching load is high. There is not the support needed to advance innovation. Another priority is the realigning of CTL to provide more strategic support. Part of this is also the coordination of education technologies across campus—we need to support key positions in departments and course coordination. We're working with the Bridgespan Group on developing a governance model, a technology-enhanced educational model, focused on where education overlaps with the university's research education commitment. Initiatives like CTL's Faculty Fellows program is an example of such growing bodies on campus. (UT Austin Interviewee 7)

As noted, the Faculty Fellows program is under development and scheduled to launch in the 2013-2014 academic year. The idea was generated by University leaders and staff and driven by a known need to more deeply engage faculty in institutional improvement efforts, to reward or recognize faculty as excellent instructors, and to take advantage of faculty horizontal and vertical networks. To refine the idea, campus leaders turned to their counterparts at peer institutions, primarily institutions engaged in the UT Austin led Public Flagships Network, to learn about various faculty fellow program models and determine a model that would best fit the needs and culture of UT Austin. The current plan is for the UT Austin Faculty Fellows program to model that of peer institutions on a much larger scale. "It's an unprecedentedly large roster for faculty fellows but this is a big school, we are trying to accomplish big things quickly, and our leaders care a lot about teaching in a lot of the right ways" (UT Interviewee 3).

In addition to University policies and strategies influencing technology-enhanced innovations in UT Austin classrooms, state appropriations and academic policies also have an impact at all levels of the University, from leadership to instruction to student success. As state appropriations to UT Austin continue to decline and deliberations around higher education governance and movement to a performance-based funding formula for higher education

continue in the state legislature, UT Austin leaders are focused on improving operational efficiencies and achieving student success and research related goals. Commissioned by the University President as a means for analyzing and recommending how the University may operate more efficiently, the Committee on Business Productivity report focused its recommendations in three buckets—administrative services, asset utilization, and technology commercialization. While announcing the Committee's recommendations and the University's plan for implementation, President Powers also spoke of the University's approach to goal fulfillment within the state and university financial contexts:

> We lag behind our competition in faculty salaries and support, we lag behind in graduate student support, we lag behind in undergraduate scholarships, and we lag behind in facilities. We began remedying some of those issues, but the recession got in the way. We need to find the resources to continue on that path. So where can we look for these resources? One place is philanthropy, and we are working hard at that, with great and generous support from our friends. And as the economy turns around, we need to continue to make our case to our legislative and political leadership about the value of UT to our State. We're working hard at that during this Legislative session, but we must also find resources within our own budgets. If we don't, we won't fulfill our academic goals. This, by the way, is the "Moneyball" philosophy I have highlighted so often and that is the underpinning of our revamped budgeting process. We have to always ask whether we're deploying the resources we have in the most effective way. In my first State of the University Address, I proposed the notion that if we could transfer just 1% of our budget from low-return to high-return activities, and then compounded that year after year, it would make a tremendous difference. We have done that. We need to continue to do that, and with a special focus on our administrative budgets and processes. We need to continue reforming our business operations similar to what the Commission of 125 did for our academic goals. (Powers, January 29, 2013, para. 8-10)

Lower state appropriations coupled with increased expectations related to academic and research performance outcomes, place UT Austin in a position where efficient operations and education delivery mechanisms are paramount to the University's success.

Finally, three policy issues pending settlement in the near-term were discussed as matters with potential to impact UT Austin in terms of resources, operations, and growth. First, the

Texas Legislature and higher education policymakers continue to deliberate a shift to a performance-based higher education funding formula. Second, the Texas Legislature is also considering significant adjustments to the state's high school graduation requirements. The proposed high school graduation requirements lower the standards by decreasing the number of math and science course requirements and study participants anticipate a decrease in student college readiness should the changed requirements be adopted. Third, the United States Supreme Court heard the case of "Fisher vs. the University of Texas" on October 10, 2012. Brought by Abigail Fisher in 2008, the case concerns the affirmative action admissions policy of UT Austin and asks the court to hold that the University's admissions policies are unconstitutional. The outcome of that case could have a major impact on admissions due to Texas' top 10% rule. The top 10% rule was adopted by the Texas Legislature in 1997 as a means of promoting diversity at Texas' public colleges and universities. Under the law, all Texas public high school graduates in the top 10% of their graduating class are guaranteed admission to any public university in the state, making UT Austin a quasi-open access university. Amended in 2009, UT Austin is now allowed to cap the number of students admitted under the top 10% rule to 75% of the incoming class. Any top 10% high school graduate not falling within the first 75% of the incoming class is provided alternative options for enrollment and retains the right to an automatic transfer to UT Austin upon completion of the core curriculum with a 2.5 grade point average at any Texas junior college. Ultimately, the top 10% rule impacts UT Austin in terms of numbers and preparedness of students enrolled. The outcomes of these three matters will impact the policies and operations by which UT Austin educates and provides services to students and the Texas community.

The University of Texas at Austin Case Study Conclusion

UT Austin is a decentralized institution operating through shared governance and customized RCM budgeting systems with a campus culture committed to a higher standard of excellence focused on student success, strategic resource investment, and public service. Nine years ago, stakeholders outlined a vision for the university to set this higher standard of excellence through teaching, research and service. Today, this vision drives the work and culture of the University community. Research participants commonly describe a sense of individual and institutional responsibility to provide students with unparalleled educational experiences and to prepare students to succeed as innovators and global citizens.

While faculty and colleges continue to test initiatives and enhance instruction to improve student learning experiences, the University's administration fosters and supports such innovation through initiatives such as the CTP. University leaders and faculty are learning from, and iterating on, such experiences and continuing to improve instructional methods and educational experiences. The University is in the process of designing and developing internal and external innovation networks to build on such work and to foster a campus-wide culture open to experimentation and focused on delivering enhanced educational experiences to the entire community.

UT Austin is well positioned to grow the amount and advance the use of technology-enhanced educational innovations across campus. To successfully accomplish such efforts, University leaders recognize the need to better align incentives so that instructors are well supported and recognized for innovation and creativity. Statewide policy issues pending settlement, including high school graduation requirement revisions under consideration by the

state legislature and university admissions policies tied to a Supreme Court case, may also impact the means and manners by which the University is able to educate and innovate.

CHAPTER V

MULTICASE STUDY ANALYSIS

The OSU, U-M, and UT Austin case studies provide readers with unique and detailed insight into the operations, strategies, and practices of three of America's top public research universities, as they navigate heightened teaching, research, and service expectations in constrained fiscal environments. These case studies serve as a starting point for the study and investigation of the evolving mission, purpose, and practice of public higher education in the twenty-first century.

At their core, these institutions are quite similar—each strives to serve the people of their state, the nation, and the world through high quality undergraduate and graduate education, research and knowledge development, and public service. Within their states, the institutions serve as significant economic and innovation engines where residents can receive a high-quality education. These institutions generate billions of dollars in revenue and expenditures yearly. They create and foster ideas and jobs. Nationally and globally, the institutions serve as hubs of research and innovation that address global challenges. Now, more so than ever, they serve as educators of global citizens through advancements in educational technologies and developments in international presences. Among their participation in numerous consortia, membership organizations, and rankings, all are members of the AAU and ranked by "U.S. News and World Report" in the top twenty public colleges and universities (U.S. News & World Report, Top Public Schools). These institutions also all operate with a decentralized system of governance,

versions of the RCM financial systems, and they have implemented a variety of technology-enhanced educational innovations across campus.

Despite such fundamental similarities, the presented research demonstrates the influence institutional context and culture has on a university's approach to innovation promotion and integration. The OSU community is universally and unequivocally committed to taking the University from "excellence to eminence, from visible to visionary" within Ohio, the nation, and across the globe (Gee, 2007, para. 15). To fulfill the University's aspirational and actionable goals, campus leaders have integrated institutional planning processes horizontally and vertically, thereby creating shared ownership within decentralized governance and finance systems. On-campus technology-enhanced educational innovations are similarly supported. While motivated faculty and academic units are encouraged to create and experiment with such innovations, the University has recently put into place core structures to generate internal and external technology-enhanced educational innovations. OSU's integrated approach to planning and strategic implementation of the RCM budgeting model cultivates a supportive stakeholder community and an environment where innovations in place at the margins inform the University's technology and innovation support structures, as well as its global ambitions.

In comparison, at U-M one of the most defining characteristics of the University's culture is the sense of responsibility to lead the state of Michigan out of the current economic recession. Recently ranked one of the nation's most innovative universities, University leaders strive to fulfill this responsibility by cultivating an institution where education of the highest quality is accessible and affordable, individuals are constantly creating and incubating innovations, and the entire community maintains fiscal prudence. To fulfill such goals, University leaders capitalize on the institution's highly decentralized governance and finance systems to set expectations and

advance innovation at the periphery. Through low-stakes grant programs, innovation prizes, and faculty accolades, campus leaders seed a university-wide culture of innovation and experimentation. Faculty takes advantage of these resources and support mechanisms to create, use, and experiment with technology-enhanced educational innovations in the classroom and beyond. The role of U-M as a key innovation and economic driver in the state, coupled with a university community accustomed to highly decentralized governance and operations, creates an open institutional environment where innovation and experimentation take place as it would in a free market.

At UT Austin leaders navigate strained political and fiscal environments by engaging stakeholders in the University's goal-setting and planning processes, remaining transparent and accountable to all stakeholders, and focusing on continuously advancing the "big rocks" (UT Austin Interviewee 6). University goal, strategy, and resource alignment has resulted from the work and recommendations of key stakeholder groups, the concurrent rise of University leaders committed to improving student successes and institutional operations, and integrated planning and budgeting processes. UT Austin is now in a position where the campus culture is shifting to one focused on cultivating individual—student and faculty—successes on-campus and beyond. In the past, administrative programs and resources have spurred and supported technology-enhanced education innovations and enabled faculty and departments to fulfill instructional needs and plans. In the near future, the University plans to shift to an embedded and consultative approach to set the stage for a campus-wide innovative climate, while creating a structured hub for the institution's externally-focused innovative endeavors.

Review of the similarities and differences among these three case studies demonstrates the critical role context plays in institutional motivation, operation, and implementation.

Although such institutions are often compared using aggregated data and high-level knowledge of systems, such as decentralized governance or RCM budgeting models, such comparisons lack context and therefore lack a more comprehensive understanding of the why- and how-type questions. Such questions include: Why is one institution or faculty member implementing a particular technology-enhanced educational innovation in a certain way? And, how do institutions and faculty members decide to, or successfully, experiment with a new type of instructional tool? To start properly answering such questions, researchers and readers must be able to consider and analyze the contexts in which an institution or an individual operates. Knowledge of OSU, U-M, and UT Austin institutional and faculty contexts and practices enables the researcher and readers to craft more well informed responses to each of the proposed hypotheses.

Hypotheses

Hypothesis #1: Fragmented policy development hinders the adoption, implementation and success of solution-oriented educational innovations

Institutional practices of shared governance and planning help to prevent fragmented policy development within institutions. Examples, including recent promotion and tenure policy revisions at OSU and U-M and the strategic planning and budgeting processes at OSU and UT Austin, demonstrate how governance and operation systems at these public research institutions are designed to integrate stakeholder perspectives. Although such democratic processes may elongate the policy development and implementation timeline, such efforts seem to facilitate increased stakeholder buy-in and more thoughtful action.

For instance, research participants from all three institutions noted the importance in addressing the misalignment of promotion and tenure policies with faculty incentives to improve instruction. While all of the institutions are working in various ways to shrink these misalignments, one OSU study participant described in detail the timeline and highly integrated process by which promotion and tenure revisions were pursued and presented:

> I did take it directly to the Faculty Senate having already met with a lot of the leaders of the Senate and talking about it for a long time, a couple of years in advance about the issue, and talking to Chairs and interviewing them....[I]t was a shared issue. I think a lot of the conversations I had with the leaders of our Senate, with our Chairs, with the President and Provost, was when would be the right time to do this? When would people be ready to think about it? We were going through the big quarter-to-semester conversion that just finished with our first semester in December, and that was such a big undertaking that we knew we couldn't take up the issue until that was done....In the sense that we had a vision, really originally articulated by the President in a speech to the faculty, of saying that we needed to be more flexible about rewarding faculty for doing what they were really doing and doing very well, especially when they are making a national and international impact, and that there ought to be more flexible criteria. He put that out there as a talking point and people talked about it for awhile and in meetings with Chairs, we meet with all Chairs at the same time. So it was kind of trickling down and it was reiterated by the Provost and a couple of speeches to the Senate and reiterated at various points by leaders. But, then the real work of doing it was when a Chair of a department would say 'OK', we're really ready to do this and we're going to go talk as a faculty (because it's really peer-driven) because they needed to talk about what would count, what it really meant for their field, what it meant for their significance of the field nationally, and once they did that they could rewrite [the policies], which could then come up to the University Senate for approval. (OSU Interviewee 5)

Commitment to integrated policy development, particularly on matters of individual and institutional improvement such as promotion and tenure, is imperative to not only policy development but also implementation. Should OSU have created the best revisions to the promotion and tenure policies but neglected to garner buy-in from department chairs, a great deal of time and energy would have been wasted.

The state-level policies focused on revised high school graduation requirements provide interesting examples of how fragmented policy development may negatively impact postsecondary educational innovations. The states in each case study have either recently passed, or have proposed, revisions to the required high school curriculum and graduation standards—policies which will impact the institutions' future classes, student preparation, and instructional needs. As such revisions, or proposed revisions, have been developed outside the institutional reach, institutional voices may not be included in the policy development and it may be difficult for the institutions to anticipate and quickly meet the academic needs of incoming students. For instance, UT Austin may see a decrease in incoming students' preparation should the state's high school graduation standards decrease. If this does occur, it will require the University to realign academic strategies and resources to better meet the needs of the incoming students and thereby hinder strategy and resource deployment to meet the needs of other priorities. Furthermore, the instability and lack of uniformity across states in these standards makes long term planning even more difficult. Therefore, it does seem that fragmented policy development across the public education and postsecondary education sectors could hinder adoption, implementation, and success of educational innovations.

On an institutional level, the research presented demonstrates collaborative processes of policy development as a result of the shared governance and integrated planning processes implemented by each institution. Such examples neither directly support nor negate the hypothesis. On a state-level, the research presented in these case studies seems to support the hypothesis, particularly between state public education and postsecondary education, as public education academic policies do eventually and directly impact the state's public higher education institutions by way of incoming student preparation and academic needs. Additional research

would benefit a more sound determination the accuracy of this first hypothesis. Such research could take place as singular case studies which track policy creation, development, deliberation, and implementation within institutions and across state entities.

Hypothesis #2: Institutions with cultures which value both, and resolutely negotiate the differences between, modernist and postmodernist approaches also adopt policies and apply strategies that support uptake and spread of educational innovations

The institutional missions, goals, and actions detailed in the OSU, U-M, and UT Austin case studies demonstrate how each of these public research universities continues to embrace and aspires to the modernist values and goals of higher education, while also pursuing and adopting postmodernist goals and approaches. Similar to the mission and vision statements of OSU and UT Austin, U-M's mission clearly highlights the institution's modernist values and underpinnings:

> The mission of the University of Michigan is to serve the people of Michigan and the world through preeminence in creating, communicating, preserving and applying knowledge, art, and academic values, and in developing leaders and citizens who will challenge the present and enrich the future. (University of Michigan, Office of the President, para. 1).

To fulfill this mission, U-M's institutional goals include improving academic excellence, access and affordability, and resource generation and allocation. The University bridges these modernist values with postmodernist priorities by including globalization, entrepreneurship, and risk-taking in the definition of academic excellence. U-M, like OSU and UT Austin, has worked to seamlessly integrate postmodernist goals and approaches into its traditional values and approaches. For instance, institutional efforts to support faculty improvement of instructional practices—such as through OSU's Digital Impact Initiative, U-M's Whitaker Fund grants, and

UT Austin's CTP program—represent the institutions' continued commitment to teaching and learning excellence by means of competitive opportunities for funding and structured support for the integration of technology-enhanced innovations and instruction.

Research participants from each of the institutions also discussed their institution's entrée and experimentation with MOOCs as an opportunity to learn about, and engage in, the frontier of higher education access and delivery, while also possibly securing new streams of revenue for the institution and faculty. Moreover, participants highlighted the important role they intend such experimentation to play in improving the instruction and education experiences for on-campus, residential students.

> There is a revolution in higher education right now. There are over 35,000 in our Coursera calculus course right now and making sure it is a high-quality course is paramount. Is it also effective? Do students learn well? If so, then we need to use it and we need to learn from it to improve the education we're delivering here on campus. Some of the implications of this [revolution] are to our financial situation—we have to participate and engage with the movement and we have to incorporate technology into our every day operations. At the same time, the residential campus is ever more important. [OSU] has a new policy that all sophomores are to live on campus because student learning goes well beyond the classroom. OSU students on campus are students who want to engage in-person in/out of the classroom and we need to take care of this part of the student population as well. The four-year residential experience means something well beyond course credits—this is a period of time that is an important developmental time in student's lives. (OSU Interviewee 7)

Based on the three case studies and such examples as those detailed above, the second hypothesis seems to hold true. One may begin to consider taking this hypothesis further by exploring the possibility that the modernist and postmodernist principles are far from mutually exclusive. To the contrary, when institutional goals are comprised of integrated modernist and postmodernist principles, success may be far more beneficial to the institution and the student.

Hypothesis #3: The constructivist challenges of instructor readiness, equitability, and sufficient resources may be key barriers to faculty use of technology-enhanced innovations harmoniously intersecting with institutional policies in public research universities

Within the barrier theme, codes the researcher used to tag obstacles to technology-enhanced educational innovation adoption and implementation include costs, faculty incentive and support structures, instructor knowledge, institutional or state policies, technologies, and time. In total, the researcher used these codes to tag 163 instances throughout the transcripts from the twenty-eight institutional interviews; time was the most frequently cited barrier, with thirty-seven occurrences, while instructor knowledge and faculty incentive and support structures came in second and third with twenty-eight and twenty-six instances, respectively. Technologies, costs, and policies followed in fourth, fifth and sixth with twenty, eighteen, and seven instances, respectively. Within the OSU, U-M, and UT Austin case studies, the first five codes show what institutional leaders, staff, and faculty perceive as the key barriers to faculty adoption, experimentation, and implementation of technology-enhanced educational innovations.

Instances of policies referenced as barriers to innovation were identified as traditional institution structures and policies for education delivery (three instances), instructor promotion and tenure policies (three instances), content and information ownership (three instances), and, specific to OSU, innovation fatigue resulting from the University's conversion from a quarter-based to a semester-based calendar. Traditional institutional policies and structures hindering technology-enhanced educational innovation adoption and implementation include the systems and processes by which the institution codes, counts, and accounts for students, courses, and credits. For example:

> Part of [the issue was] the way we implemented our student information system, our Oracle system, and the policies and processes used to authenticate students,

> our name dot number system. When you're a student, a stack is opened with your major and sub-majors. If you're not admitted to the University there was no way to create that stack, or name dot number. What we realized was a backdoor way of entering our distance education students in the system. We determined we had to enter distance education students in the same way we enter continuing education students or student recruits who have been not yet formally admitted. So using that same technology we were able to get around the technical limitations of bringing distance education students into the University systems. Once the technicalities were figured out, it then became a policy issue and we had to get the policy for student authentication changed and approved by the Board of Trustees. Now, any person with the proper credentials, regardless if they are already a student or affiliated with the University, can sign up for one of our distance education courses. (OSU Interviewee 6)

Though such technicalities and polices may seem minor, they are fundamental to how institutions operate. For institutions to be able to deliver education in new ways means they must determine how to marry such systems with out-of-the-box delivery approaches and increasingly diverse student populations. In "Cracking the Credit Hour," Laitinen (2012) explores such issues, reaching beyond the purpose of innovation adoption and implementation, and discusses the possible beneficial outcomes of institutions adopting policies outside the traditional credit hour and semester parameters:

> If institutions are clear in determining what they want students to know, what students already know, and how to credit what students do know, they can spend their time focusing on what students do not yet know. This could result in not just better outcomes, but faster and less expensive outcomes. (p. 21)

In such instances, whether it is student authentication or competency-based credits, the technology-enhanced instructional innovations push traditional institutional policies and mechanisms beyond their capacities. As means for instructional delivery continue to evolve and student populations continue to grow and diversify, these systems by which institutions traditionally operate and record learning, or outcomes, must also evolve.

According to research participants, traditional instructor promotion and tenure policies tend to act as barriers to faculty instructional experimentation and implementation. An example

provided in the UT Austin case study highlights the importance placed on course instructor survey results. Another example provided by a U-M participant highlights research and publication requirements for tenure-track faculty. As detailed in the case studies, to better align faculty evaluation requirements with faculty work and institutional goals, OSU and U-M leaders and faculty have worked to revise the promotion and tenure policies to include and provide credit for faculty creativity, entrepreneurship, and innovation. Participants from all three institutions also note strategic institutional support structures in place, and under development, to effectively support instructional practice improvement and educational technology experimentation among faculty who also face traditional promotion and tenure pressures. Again, as institutional goals and education delivery mechanisms evolve, the traditional policies related to promotion and tenure requirements and evaluation processes are also being pressured to change.

The OSU and UT Austin case studies describe universities in the process of developing sustainable institutional models for the delivery and support of educational technologies and distance education. To build these models, OSU and UT Austin leaders look to the experiences and practices of their most innovatively successful faculty and peer institutions. The design of the recently launched Distance Education and e-Learning office at OSU required two years of administrator and faculty collaboration prior to its launch in December 2012. Instructors already creating and engaging with new education technologies and delivery models served as key learning resources and thought partners to University administrators during the initiative's development and through its launch. UT Austin has used faculty experienced with the CTP in much the same way during the development of its new model for education technology governance. Going forward, administrators plan to engage these and similar individuals in the

Faculty Fellows program so that they remain, and are rewarded, as administrative resources and embedded college- and departmental-level supports.

Instructor readiness, equitability, or knowledge does not necessarily prevent faculty innovations from harmoniously intersecting with policy, though such characteristics may act as barriers to faculty adoption and use of innovation. Alternatively, the third hypothesis might be better stated as: Instructors applying constructivist principles in their teaching practices may be some of the most important sources of information to university leaders and administrators charged with creating sustainable models of education technologies and online learning on campus.

Hypothesis #4: The most successful educational innovations occur within environments where the five collective impact strands are aligned and embedded in the social systems

The research supports Kania and Kramer's (2011) contention that successful technology-enhanced education innovation initiatives require alignment of: (a) a common agenda, (b) shared measurement systems, (c) mutually reinforcing activities, (d) continuous communication, and (e) backbone support organizations. Though it is difficult to resolutely confirm hypothesis four due to the constantly shifting contexts and evolving technology-enhanced educational initiatives on each campus, initiative paths and progressions indicate institutional movement to align these five strands. Institutional transformation typically occurs in a slow and iterative fashion, thereby making it difficult to recognize the process or path in light of singular instances or initiatives.

Although institutional agendas usually seem like moving targets due to constantly shifting contexts and rapid technological advances, OSU, U-M and UT Austin leaders' focus on clear and measurable goals is quite striking. Leaders, and study participants, from each

institution outlined three or four goals tied directly to their missions, visions, and state and institutional needs. University leaders clearly set the high-level institutional agendas and, thereby, determined the "big rocks" in which resources will be invested, while leaving means for goal attainment open to the institutional systems of shared governance, teaching and learning, and research.

Research participants from all three institutions highlighted the need for improved and shared measurement systems. For example:

> One of the challenging things is looking at a system as a whole. So, when you teach a class you have a system—it's a whole system. It's so hard to isolate particular instructional interventions versus instructors versus instructional approach. What was the whole instructional approach—team based learning or lecture? How did they use the clickers? What were the kinds of questions the instructor asked? People have been trying to set up controlled experiments in education where the same instructor uses clickers and no clickers, and you can do that but then I think it becomes an artificial activity and so narrow in its application that you can't really use that well. But then, if you start looking at systems, like a classroom as a system, people say of its 'fuzzy science' and it's not real. So, from an assessment perspective people want evidence....Our marketing world is really understanding how to use data to predict things about people. In education, the information might be there but we don't know how to capture it and, once we capture it, do we know how to use it in a positive way? I think we're just scratching the surface. We're doing all these things to improve teaching and improve education delivery, but I think its data and assessment that really has to be the foundation for change. (UT Austin Interviewee 8)

Participants indicated a need to collect and use the data and information available in better and smarter ways. OSU embeds assessment into the strategic planning processes; U-M faculty collaborate across colleges and centers to measure impacts of technology-enhanced educational initiatives and experiments; and UT Austin is bundling measurement and assessment as a key strand in its development education technology governance model.

The need to include mutually reinforcing activities and align such activities with the overall strategy resonates across each campus at the administration, unit, and faculty levels.

Since technology-enhanced educational initiatives grow from the top-down (administration) and bottom-up (faculty and students) approaches, the researcher coded faculty incentives to experiment and implement such innovations including self-motivation (65 tagged instances), student need (75 tagged instances), recognition and awards (39 tagged instances), support structures (eighty-four tagged instances), funding (70 tagged instances) and institutional need (20 tagged instances). The high number of instances tagged as support structures, student need, funding, and self-motivation indicate the need for mutually reinforcing activities. To encourage initiative and innovation engagement, it is important that universities provide faculty with support structures and funding opportunities such as grant awards, prizes, and centers focused on instructional improvement. It is also important for goals and priorities to be shared across all levels of the institution so that if a faculty member experiments with an innovation his/her work also supports academic unit and institutional needs and goals.

Three research participants, one from each university, explicitly noted a need for improved and continuous communications within the institutions. A UT Austin interview best summarized this need.

> One thing that is challenging is that there is not a formal, or informal, channel of communication, between colleges even. For instance, when another college wants to change the way they teach a particular course we sort of hear that is coming down the pike but we don't really know anything about it until it formally shows up at the committee meeting, where the Associate Deans get together and look at legislation. The thing is, that's too late, because if we knew what was being proposed ahead of time we could look at our degree programs and see how the changes fit and we could inform our associate dean prior to him going to the meeting. This is just one example, but this happens often. (UT Austin Interviewee 1)

Rapidly emerging technology-enhanced initiatives, such as course delivery MOOC platforms and multiple modes for instructional delivery, heighten the need for improved communication channels so that timely and accurate information can be easily shared with internal and external

constituencies. According to one participant, faculty and institutions are changing the pace by which they work so as to remain engaged as active participants in emerging initiatives and innovations. To work effectively in such circumstances, accessible channels for communication and workflow must be integrated into institutional systems and structures.

The OSU and UT Austin case studies provide good examples of the processes by which these institutions are establishing backbone support structures and moving to the five strand alignment. Research participants from both institutions describe the reasoning for, and process of, establishing sustainable models for education technology support and governance. "We are developing internal and external innovation networks, figuring out how to increase support structures and where to align resources, and establishing a model to help the University navigate education and research commitments and priorities" (UT Austin Interviewee 7). These instances demonstrate strategic movement of the institutions to promote their institutional agendas and goals, establish means by which emerging technology-enhanced educational innovations can be measured, develop support networks for faculty engaging with such innovations, create common internal and external communication channels, and provide backbone support for the implementation and operation of such innovations across campus.

Hypothesis #5: The failed adoption and implementation of promising educational innovations occur within environments where there are missing, or misaligned, collective impact strands

While not all of the technology-enhanced education initiatives on the OSU, U-M, and UT Austin campuses have succeeded, the failed initiatives were less apparent and less a part of the research participants' vernacular. Though this probably could be expected, the research indicates that this is true because the institutions and faculty tend to approach such initiatives as iterative

processes, as described above. In describing such processes, however, research participants sometimes noted changes made to initiatives for purposes of improvement, which could indicate misalignment in one of the five collective impact strands. Accordingly, and in line with the previous hypothesis, the research suggests support of hypothesis five and the notion that gaps in the collective impact strands lead to less successful initiatives and innovations.

For example, a research participant discussed an instance where a faculty member was using the flipped classroom approach in a large introductory course with five class sections and multiple lab sections for the first time. Though the intentions of the faculty member, department and institution were aligned, a coordinated backbone support structure was missing, which, in turn, hindered the faculty member's use of the available mutually reinforcing support structures and, therefore, made it difficult for the faculty member to successfully implement the flipped classroom model. This instance provides a nice example of a potentially failed innovation implementation due to missing collective impact strands. However, the example is also being related as part of the evolution of institutional processes and practices, including the development of a coordinated and strategic backbone support structure for such innovations.

Additional Findings

Implementation of, and experimentation with, technology-enhanced educational initiatives across the OSU, U-M, and UT Austin campuses is simultaneously fostered from the top-down and bottom-up. Institutional leaders strive to seed and support instructional innovations and improvements as such initiatives seem paramount to improving productivity, fulfilling missions, and achieving goals. Faculty members adopt and experiment with technology-enhanced educational innovations for many reasons including those most widely

referenced: accessibility, personal and professional interest, and student academic needs. The strategies and structures by which the universities seed and support instructional innovations are dependent on institutional contexts and cultures. From an outside perspective, OSU, U-M, and UT Austin are quite similar in terms of their (1) positioning as the states' top ranked public research universities; (2) purpose to serve the state and public good through teaching, research, and service; (3) goals focused on academic excellence, affordability, and resource stewardship; and (4) structure of shared governance and RCM budgeting systems. However, each university's unique economic, political, and social contexts and cultures influence the policies and strategies used to accomplish relatively similar agendas. Additionally, the institutional systems of shared governance and integrated planning seem to ensure the creation and adoption of the best approach for each university within the given contexts. U-M's strategies related to fostering innovation and experimentation across campus work well for U-M, but would not necessarily transfer and be as successful at OSU or UT Austin, or any other campus, and vice versa.

While OSU, U-M, and UT Austin use various strategies to foster and support technology-enhanced educational innovations, leaders and faculty engaged in the process of innovation adoption and implementation run into similar institutional policies and challenges at each institution. Currently, technology-enhanced educational innovations challenge traditional higher education institution paradigms and policies such as student authentication systems and promotion and tenure policies, content ownership, and systems of learning measurement (i.e. credit hours and semesters). This list, however, may be just the beginning of what could soon be a long list of policies and paradigms that technology-enhanced educational innovations challenge. Many questions remain and, it may be that many more questions have yet to even be articulated:

> Part of what we're seeing in the national landscape now are new delivery models—right now it's the MOOCs—and the technology is driving change. But there are, for me, policy questions—critical policy questions, left. Policy questions that haven't caught up to the technology. For example, a student takes a MOOC and gets a certificate, does that equate to college credit? Are the competencies of the MOOC taught by Stanford the same as a MOOC taught by Iowa State the same as a....I don't know if community colleges are teaching MOOCs...but what happens when a student brings a certificate to UT Austin? Do we give them credit? Do we give them a test to assess whether or not they learned what we think they could have learned in an equivalent course at UT Austin? Do we move away from a credit bearing model and start thinking about competencies? And, start assessing writing skills, quantitative reasoning, critical thinking, ability to engage in research, ability to do problem solving? Would we really want to abandon content and just examine core competencies? So I think we're seeing a lot of changing in how we deliver education but how we assess is still 50 years old. Teaching methods are probably somewhere in between. We have faculty members with one foot in the innovation door and one foot in the traditional lecture model, but I think assessment people aren't talking about. Some of my goals are to actually try to get ahead of that curve or at least catch up to that curve of what's happening in the landscape of new delivery models and figure out what is the best way to deliver and assess instruction. What do we need to be focusing on when we're talking about student skills and student competencies? And then how do we assess it in a way that is defensible and translates into the current practices of higher education. So, competency based assessment is great when WGU [Western Governors University] talks about it with their online courses because they can do it—can UT Austin think about competency based assessment or is that 20 years off? (UT Austin Interviewee 8)

Initially, the research demonstrates the technology-enhanced educational innovations quickly run into traditional paradigm and policy obstacles, such as student authentication systems and promotion and tenure, but many more policy challenges lay ahead. While some sit on the fringes of institutional scope, many more may lie at the heart of traditional institutional operations and field paradigms.

Much like the institutional policy challenges and questions, the intersections of technology-enhanced educational innovations and state higher education policies are beginning to surface with even greater challenges and more difficult questions anticipated in the near future. Currently, from the research participants' perspective, adoption, and implementation of

technology-enhanced educational innovations on campus collide with state policies that tend to indirectly impact postsecondary systems and institutions. Participants noted the proposed and/or recently adopted changes to high school college readiness and graduation standards as a key intersection of state policy and institutional innovation adoption and use. For instance, institutional engagement in the provision of MOOC courses not only helps to fulfill institutional goals of reaching new audiences, generating new revenues, and recognizing brilliant instructors but delivery of instruction through MOOC platforms may also allow institutions to more easily help underprepared high school graduates succeed as college students. Research participants, particularly university leaders, noted this policy-innovation intersection as key to the institution's long-term success.

Other critical intersections of state policies and instructional innovations, such as learning measurement systems (i.e. credentialing and program requirements) and articulation and transfer policies, were not noted by research participants, but may soon be part of the larger higher education deliberations. Before starting data collection, the researcher assumed that a key intersection between state policy and technology-enhanced educational innovation would be state appropriations and funding formulas. To the contrary, research participants only noted state appropriations when discussing the overall fiscal conditions in which the institutions operate. In light of twenty plus years of declining state fiscal support for higher education and a perceived lack of concern for state appropriations, the research encourages further exploration of the intersections of public higher education institution and state spheres of influence.

Conclusion

A challenge to concluding this study is that it focuses on the current state of innovation and policy in higher education. The challenge lies in the fact that the present is never static and that this present, in particular, happens to be a period of significant transition in the field of higher education, in general, and in the institutions studied, in particular. Technological innovations change the higher education landscape on what seems to be a daily basis. Not only are more educational opportunities made available to a wider swath of people on a regular basis, but also more institutions and organizations are delivering such opportunities more regularly and in new ways. Institutions are stretching beyond their comfort zones and beyond their traditional paradigms in order to be a part of the discovery process, sometimes voluntarily and sometimes as a concession for internal and external stakeholder pressure.

OSU, U-M, and UT Austin are three of the leading public research institutions in such efforts. OSU and U-M are Coursera partners, UT Austin is a partner in edX, and all three institutions seek to learn from such partnerships so that they may in turn improve instruction for residential and local students. While U-M seeds a culture of innovation and risk-taking through relatively unstructured competitive and non-competitive grant initiatives, OSU and UT Austin are launching models with much the same intent but with a more strategic balance of structured and unstructured support mechanisms and services. Each institution is working to establish means of operation which best fit their contexts and cultures. The summer of 2013 will introduce a heightened period of transition on all three campuses as the Provosts at each institution have stated they are stepping down. At the time of this writing, OSU and U-M have named successors, both internal. The process of transition has already started, and will conclude in July and June respectively. UT Austin's formal transition will occur in August, with a

successor not yet named. Ideally these periods of transitional leadership will translate into continuity and progress in most aspects of institutional governance, strategic planning, and operations. The new Provosts are essential to the success of coordinated technology-enhanced educational initiatives and strategic policy development.

Overall, this study lays the groundwork for future research, which may focus on implementation and impact of technology-enhanced educational innovations, applicability of results to various types of postsecondary institutions, public higher education governance and systems, evolution in institutional and state higher education policy, or the interactions and intersections among public higher education stakeholders. Many implementation, impact, and policy questions remain open; many more questions remain unrecognized; and further investigation into the relationship of institutional and state goals and policies would benefit the field in academics and practice.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD

LETTER OF APPROVAL

MEMORANDUM

TO: Kathleen Brock **IRB # 12- 193**
Dr. David Rausch

FROM: Lindsay Pardue, Director of Research Integrity
Dr. Bart Weathington, IRB Committee Chair

DATE: November 29, 2012

SUBJECT: IRB # 12-193: A Comparative Analysis of the Intersection of Higher Education Policy and Educational Innovation

The Institutional Review Board has reviewed and approved your application and assigned you the IRB number listed above. You must include the following approval statement on research materials seen by participants and used in research reports:

The Institutional Review Board of the University of Tennessee at Chattanooga (FWA00004149) has approved this research project #12-193.

Please remember that you must complete a Certification for Changes, Annual Review, or Project Termination/Completion Form when the project is completed or provide an annual report if the project takes over one year to complete. The IRB Committee will make every effort to remind you prior to your anniversary date; however, it is your responsibility to ensure that this additional step is satisfied.

Please remember to contact the IRB Committee immediately and submit a new project proposal for review if significant changes occur in your research design or in any instruments used in conducting the study. You should also contact the IRB Committee immediately if you encounter any adverse effects during your project that pose a risk to your subjects.

For any additional information, please consult our web page http://www.utc.edu/irb or email instrb@utc.edu

Best wishes for a successful research project.

APPENDIX B

INSTITUTIONAL REVIEW BOARD

APPROVED APPLICATION

FORM A:

APPLICATION FOR REVIEW OF RESEARCH INVOLVING HUMAN SUBJECTS

If your research involves protected health information, please also submit Form H to the IRB, refer to (www.utc.edu/irb) for the appropriate forms.

Investigator's Assurance: By submitting this protocol, I attest that I am aware of the applicable principles, policies, regulations, and laws governing the protection of human subjects in research and that I will be guided by them in the conduct of this research.

Title of Research:	A Comparative Analysis of the Intersection of Higher Education Policy and Educational Innovation

		Dept.	Mail Code	Email
Principal Investigator	Kathleen Brock	**Doctoral Program in Learning and Leadership**	Dept. 2242	yxz634@mocs.utc.edu
Other Investigator				
Other Investigator				
Faculty Advisor (for student apps)	Dr. David Rausch	**Doctoral Program in Learning and Leadership**	Dept. 2242	David-Rausch@utc.edu

Please check that all of the following items are attached (where applicable) before submitting the application:

- Any research instruments (any tests, surveys, questionnaires, protocols, or anything else used to collect data)
- All informed consent documents (see www.utc.edu/irb for sample informed consent documents)
- Permission from applicable authorities (principals of schools, teachers of classrooms, etc.) to conduct your research at their facilities
- Appropriate permission and signatures from your faculty advisor (if applicable).
- Please be sure the entire application is filled out completely.

****All student applications must be signed by the faculty advisor then scanned and submitted electronically, OR submitted directly by the faculty advisor.**

All applications should be submitted by email to instrb@utc.edu.

Anticipated dates of research project: December 1, 2012 (or upon IRB approval) – May 31, 2013.
Please allow 2 weeks for IRB processing from date of submission.
Please be aware that you cannot begin your research until it has been officially approved by the IRB.

Type of Research:
☒ Dissertation/Thesis
☐ Faculty Research (Please see information at the bottom of this form if this research pertains to a grant opportunity)
☐ Other (please explain):

Purpose/Objectives of Research: (Briefly state, in non-technical language, the purpose of the research and the problem to be investigated. When possible, state specific hypotheses to be tested or specific research questions to be answered. For pilot or exploratory studies, discuss the way in which the information obtained will be used in future studies so that the long term benefits can be assessed.)

Purpose of the Study

Amid shrinking federal and state support for higher education systems and institutions, the current national agenda for higher education calls on institutions to produce the highest number of high quality postsecondary degrees and credentials in the world while curtailing costs. Institutions must transform operations to increase productivity by lowering costs, increasing efficiencies, and delivering high quality education to more students over a shortened period of time. As state and national stakeholders work diligently to address such criticisms through comprehensive and collaborative action, the need for more efficient, effective, and scalable postsecondary delivery processes and practices continues to grow.

To successfully move forward, stakeholders must act with more than just an accurate understanding of public needs and processes of innovation adoption. Stakeholders must also have an accurate and objective understanding of the social, economic, and policy contexts of operation. This study focuses on the last of the listed contexts—the policy context—and seeks to build understanding of the policy context in which states and lead institutions of public higher education must work to meet society's needs through transformed operations and practices. This study also seeks to inform policy development and demonstrate implementation of technology-enhanced educational innovation in postsecondary environments open to adopting and using proven and experimental practices and processes.

Study Objectives: Research Questions

The objective of the study is to provide stakeholders with an understanding of how state and institutional policies impact technology-enhanced educational innovation and is to answer the following questions:

5. How do states and institutions create policy to address higher education productivity challenges?
6. How do states and institutions use policy to address higher education productivity challenges?
7. How do successful educational innovations intersect with state and institutional policies?
8. How do failed educational innovations intersect with state and institutional policies?

Hypotheses

The researcher intends to test following theory based hypotheses:

1. Most state and institutional policy development is a fragmented process, which hinders the adoption, implementation, and success of technology-enhanced educational innovations.
2. States and institutions with cultures that value both the modernist and postmodernist approach, while balancing the differences between them, also adopt and apply policies that support uptake and spread of educational innovations.
3. Constructivist challenges of instructor readiness, equitability, and resource insecurity may be key barriers to educational innovations harmoniously intersecting with state and institutions policies in public research universities.
4. The most successful educational innovations occur within environments where the five collective impact strands are aligned and embedded in the social systems.

Relevant Background and Rationale for the Research: (This section should present the context of the work by explaining the relation of the proposed research to previous investigations in the field. Include citations for relevant research.)

The current national public agenda for education calls on American colleges and universities to produce more high quality postsecondary degrees and credentials than any other nation while also maintaining and/or reigning in costs. Just as the nation calls on higher education, as a public good, to shepherd the populace out of the current social and economic slump, public financial and social support of the system dwindles. Hence, the field of higher education and its institutions must transform operations and demonstrate impact through valid results; higher education must increase productivity and find new ways to lower costs, increase efficiencies, and improve quality while delivering education to a greater mass of people over a shortened period of time. As key state and national stakeholders work around the clock to address such criticisms through thoughtful research and action, the need for development of innovative practices in postsecondary education continues to grow.

Background

"No matter how you cut it, more education pays," (Carnevale, Rose, & Cheah, 2011, p. 20) and as more and more education, economic, and labor experts come to this same conclusion the field of higher education may no longer be viewed as a luxury good. Rather, higher education will be deemed a means to equitable, and possibly improved, opportunity for social

mobility and economic growth. Leading the research and work, organizations such as the Lumina Foundation and Georgetown University's Center on Education and the Workforce inform and advance the current national public agenda for increased higher education productivity. Motivated by the greater purpose of spurring individual and national social and economic prosperity, the work of such organizations continues to show increased educational attainment benefits, both for individuals and all of society. Clearly, education functions as a means of national growth, and increasing educational attainment may be one of the few attainable and sustainable ways to move the nation beyond the confines of the current recession.

Postsecondary degrees and credentials offer individual earners greater career opportunities and lifetime earning power. Therefore, the Lumina Foundation (2011a) claims higher education "has become the new gateway to the middle class" (para. 1). The Carnevale, Rose, and Cheah (2011) report, "The College Payoff," provides findings on the personal economic benefits of postsecondary degree and credential attainment. Specifically, median lifetime earnings of individuals holding only a high school diploma equal $1.3 million or $15.67 per hour; median lifetime earnings of individuals with some college education but no degree equal $1.5 million or $18.69 per hour; median lifetime earnings of individuals earning associate's degrees equal $1.7 million or $20.77 per hour; and median lifetime earnings of individuals earning bachelor's degrees equals $2.3 million or $27.26 per hour (Carnevale et al., 2011). Data show, on average, the more individuals participate in postsecondary work and attain postsecondary credentials, the greater their lifetime earnings.

Further, greater higher education attainment offers states and the nation a means for moving out of the current economic slump and preparing for the economy on the other side of the recession. According to Georgetown University labor economist Anthony Carnevale, jobs at all levels are lost during recessions, but once recessions end the jobs that come back are those that require more postsecondary credentials (Lumina Foundation, 2011a). In the "E^2: The Critical Equation of Education and Economic Prosperity" video (Lumina Foundation, 2011a) Carnevale states:

> The economy will recover. The only question is how fast will it recover? We think we'll be fully back online by the end of 2015, maybe early 2016. We know that a very substantial share of the jobs that we've lost that don't require postsecondary education, they are not coming back, and when we come out the other side of this thing there will be a higher concentration of jobs that require postsecondary education. (Lumina Foundation, 2011a)

The compounding effect of providing greater educational opportunities to individuals results in greater social and economic opportunity for states and the nation. "More states are realizing their economic vitality is increasingly tied to getting students into and through college" (Lumina Foundation, 2011a). In the context of the recession, the need for more postsecondary credential earners is not only a matter of individual prosperity, but also one of national economic health:

> Most state policymakers and higher education leaders no longer doubt that the U.S. must dramatically increase the number of students who earn high-quality postsecondary degrees and credentials, because skills and knowledge are the essential building blocks with which economic growth and prosperity are created. (Lumina Foundation, 2011b, para. 1)

While expert opinion varies on the exact number of additional graduates required for national educational and economic growth, the Lumina Foundation estimates a need for at least 60% of American adults to hold postsecondary degrees by 2025. Nearly a 20% increase from the current national estimates, this goal aligns with the Center on Education and the Workforce's estimate that 63% of American jobs will require postsecondary education by 2018 (Carnevale, Smith, & Strohl, 2010).

In addition to enhancing the need for improved postsecondary degree production, the recession also defines the political, social, and economic contexts in which higher education productivity must increase. National, state, and institutional financial resources are limited, if not shrinking, while costs continue to rise, and individuals must increasingly act as price sensitive consumers. The field of higher education is not immune to this scenario; systems and institutions of higher education must increase productivity by granting high-quality degrees and credentials to more individuals, with fewer resources, at lower costs.

Within these social and economic contexts, the American higher education system finds itself under great pressure from internal and external stakeholders from every sector. A recent New York Times article (Martin, 2012) discusses such challenges and spotlights the Ohio State University (OSU) as an example of an institution in the midst of navigating such pressures. According to Martin (2012):

> College presidents across the country are confronting the same realization, trying to manage their institutions without sacrificing quality….Tuition increases had been a relatively easy fix but now—with the balance of student debt topping $1 trillion and an increasing number of borrower struggling to pay—some administrators acknowledge that they cannot keep putting the financial onus on students and their families. (para. 5)

The article (Martin, 2012) goes on to share OSU President E. Gordon Gee succinct statement that "'the notion that universities can do business the very same way has to stop'" (para. 4). The Lumina Foundation, in partnership with higher education policy and practice experts, takes this need for change and opportunity for enhanced educational attainment steps further. Currently, Lumina works with a network of 23 states and higher education systems on a four-step framework to increase higher education productivity. The four steps include:

5. Performance Funding: Targeted incentives for colleges and universities to graduate more students with quality degrees and credentials.…
6. Student Incentives: Strategic use of tuition and financial aid to incentivize course and program completion.…
7. New Models: Lower-cost, high-quality approaches substituted for traditional academic delivery whenever possible to increase capacity for serving students.…
8. Business Efficiencies: Business practices that produce savings to graduate more students. (Lumina Foundation, 2011c, p. 5)

Lumina and its partners believe that this structured and systematic approach, detailed in the "Four Steps to Finishing First" report (Lumina, 2011c), will result in the improved capacity of higher education systems and institutions to support student postsecondary completion at lower costs without sacrificing quality.

Statement of the Problem

How, then, do institutions of higher education best address this call to action? As the OSU example demonstrates, many institutions are looking at ways to streamline business practices and deliver education more efficiently. In instances like the University of North Carolina at Chapel Hill and the University of Texas at Austin (UT Austin), business consultants conduct audits of institutional business processes resulting in diagnostics and recommendations for improved operational efficiency and strategic planning. In her Chronicle of Higher Education piece, "For Student Success, Stop Debating and Start Improving," Hilary Pennington (2012) focuses on the education quality and student success components of the productivity equation. Opportune areas for focused reform efforts include public finance of higher education, traditional semester and credit hour frameworks, application of technology in the classroom, innovation generation, and transparency and use of data (Pennington, 2012). In the conclusion of her piece, Pennington (2012) charges:

> The increasing pressure on higher education to produce more degrees of higher quality at a cost students can afford is both overdue and necessary. But in the end, the most-effective changes will come from institutions of higher education themselves.…Change will require multiple points of view and many people working on the different dimensions of the problem over a sustained period of time. (para. 24-26)

As the focus of much public and institutional attention, technology-enhanced education innovations generate significant publicity within the field among researchers as well as practitioners. Such innovations also demonstrate potential to greatly and sustainably improve higher education productivity. In Daphne Koller's (2011) New York Times article, "Death Knell for the Lecture: Technology as a Passport to Personalized Education," the potential impact technology may have on forwarding the current public agenda is compared to the role technology has played in the American economy:

> Key to this transition was the use of technology—from crop rotation strategies to GPS-guided farm machinery—which greatly increased productivity. By contrast, our approach to education has remained largely unchanged since the Renaissance: From middle school through college, most teaching is done by an instructor lecturing to a room full of students, only some of them paying attention.…Until now, it has been hard to see how to make individualized education affordable. But I argue that technology may provide a path to this goal. (para. 4-6)

Although technology-enhanced educational innovations seem promising, much about how, when, where, and why to adopt and implement such tools remains unknown. Within the context of policy, and the role policy plays in shaping the use of technology-enhanced educational innovations for the advancement of public higher education, our knowledge and understanding is largely, if not only, assumption-based. The following research seeks to clarify this intersection and to increase reader and stakeholder understanding of why, how, and what state and institutional policies help or hinder the development, adoption, and implementation of technology-enhanced educational innovations in lead public research universities.

Rationale for the Study

Higher education productivity success requires collaboration, investment of a variety of resources, and openness to experimentation and adoption of educational innovations. As this study focuses on the intersection of higher education policy and technology-enhanced educational innovation, the researcher intentionally limits the scope to specifically address higher education policy and productivity innovation in terms of educational technologies.

Institutions of higher education may be most highly regarded for the innovations they generate, but much of the innovation created and adopted for the purpose of institutional education delivery is limited, in focus and source, and highly disjointed. Part of the fabric of innovation since World War II, innovation in higher education generally occurs via technology and within teaching and learning centers and practices (Silver, 1999). Silver (1999) attempted to construct a typology from which to analyze and understand higher education innovation, which then led to further examination of the idea of innovation when considered through a policy perspective. The author (1999) concludes: "The study of innovation in teaching and learning is a study of interactions, attitudes, institutional policies and practices, national contexts, and the consensual and confrontational characteristics of all of them" (p. 155). Silver (1999) ends with questions focused on how innovation may be fostered within educational environments influenced by numerous contextual spheres.

Policymakers also work to spur and steer educational innovation. In 1989, author Frans A. van Vught analyzed the relationship between governmental strategies to drive higher education innovation and the behavior of postsecondary institutions in Europe. van Vught (1989) found restrictive elements and approaches by governmental entities would not spur innovation within or elicit the desired response from institutions of higher education. However, he did find that internal institutional fragmentation encourages innovative behavior at the individual and unit level. van Vught (1989) notes that governments may use this to their advantage if approached in context and in light of external market forces.

It is important to also consider that institutional leaders attempt to spur internal innovation within operational systems and practices. Beyond their teaching and learning core, institutional leaders seek to improve operational and resource management efficiencies. Recent examples of new models include the open learning and business models of Western Governors University's competency-based curriculum, MITx, and Carnegie Mellon's Open Learning Initiative (Sheets, Crawford, & Soares, 2012). According to numerous experts (Christensen & Eyring, 2011; Sheets, Crawford, & Soares, 2012), almost no technological innovation in higher education will succeed without an equally innovative business model for delivery, support, and sustainability.

Methods/Procedures: (Briefly discuss, in non-technical language, the research methods which directly involve use of human subjects. Discuss how the methods employed will allow the investigator to address his/her hypotheses and/or research question(s).)

The researcher plans to employ a multicase study approach to examine the influence and impact of state and institutional higher education policy on adoption and use of technology-enhanced educational innovations. The multicase study will be comprised of three dual part case studies so that the researcher can gather data and report on each individual case, while making explicit linkages across the cases by means of common research questions.

The researcher plans to approach this study as qualitative research based on three dual-part case studies. The case studies focus on three of the top American public research universities and their home states—the University of Texas at Austin (UT Austin), the Ohio State University (OSU), and the University of Michigan (U-M). The three proposed case studies represent three states and institutions under great political and social pressure, on both local and national levels, to improve higher education productivity by economical, impactful, and vastly scalable means. UT Austin, OSU, and U-M are relevant to understanding and characterizing the whole of public higher education institutions.

The researcher also selected these institutions and states because their commonalities allow for better comparison across the cases. The case similarities and differences will provide opportunities to learn about complex state and higher education institutional contexts, resulting in a greater understanding of the overall field. Case commonalities include institutional membership in the AAU, the leadership role of each institution among American higher education institutions, the leadership role of the institutions as the flagship university within their home states, and the expressed and continued interest of the institutions in collaborating with and learning from one another. A few differences among these cases include the state and institutional political environments, governance structures, and history.

Data Collection

Data used to inform the study will be collected through observations of legislative hearings, institutional environments, and interviewee environmental interactions, as well as through a series of in-person and phone interviews with state and institutional leaders and postsecondary stakeholders in each case study locale. In a case study approach, the researcher is dependent on multiple forms and sources of data as a means of fully developing the case and accurately conducting analysis. Therefore, the researcher intends to observe as much as possible, including studying records, gathering artifacts, and compiling such information to construct the context for each case. For example, the researcher plans to collect both archival records and current data through observations of legislative hearings (live and streamed online) and during meetings with institutional leaders and stakeholders pertaining to educational innovations. Prior to conducting observations, the researcher will determine a set of questions to answer and aims to accomplish during the observation process. In-person interviews will be conducted during scheduled state and institutional site visits; phone interviews will also be scheduled in advance and only conducted if an individual is unable to meet in-person during the state and institutional site visit. During these site visits, in addition to interviewing, the researcher will be observing constantly and taking notes on the various social, political, economic, and situational circumstances that make up the greater case context.

During the interviews, the researcher intends to collect data via note-taking and audio recording. The established interview protocol, will allow the researcher space to take notes and organize thoughts during the interview. Additionally, the researcher plans to carry a notepad during each site visit to record observational notes during, and/or immediately after, an encounter or event. Following each state and institutional visit, the researcher intends to review, add to, and edit all notes written by hand. The researcher will later type these notes and add them to a master database. To ensure the correct information is collected and interpretations made, the researcher plans to triangulate all relevant, debatable, and critical data points by employing multiple research methods (interviewing, observing, reviewing records) and gathering input on such points from interviewees from various groupings. The researcher will also employ

similar methods to triangulate data across the cases to ensure credibility of the multicase study as a whole.

Subject Population: (List the size of population be used, and check if any of the populations listed apply to the study. Discuss criteria of selection or exclusion, population from which they will be selected, and duration of involvement. *NOTE: Federal guidelines require selection of subjects be equitable within the exclusions, and subjects meeting the criteria cannot be discriminated against for gender, race, social or financial status, or any other reason.)*

Describe Sample: The research employs similar selection criteria in structuring the individual case studies. The researcher intends to conduct interviews with House and Senate higher education committee members, chairs, and staff; institutional presidents; provosts; vice provosts; faculty; and students, as well as leaders and staff in the teaching and learning division at each institution. The selection process for specific interview participants will be guided by the criteria listed above, as well as by the availability of individuals, diversity of interviewee backgrounds within cases and case groups, and similarities of interviewee backgrounds across cases and case groups.

Approximate Number of Subjects: 30

Subjects Include (check if applicable):

Minors (under 18)	☐
Involuntarily institutionalized	☐
Mentally handicapped	☐
Health Care Data/Information	☐

IF YOU HAVE CHECKED THE BOX PERTAINING TO HEALTH CARE DATA, BE SURE YOU HAVE COMPLETED ANY NECESSARY HIPAA FORMS AS WELL.

Informed Consent: Describe the consent process and attach all consent documents. See www.utc.edu/irb for sample informed consent forms and complete information regarding informed consent.
All research must be conducted with the informed consent (signed or unsigned, as required) **of all participants:**

Each institution has agreed to allow the researcher to conduct the interviews with university personnel (permission letters attached).

Prior to commencing any interviews, the researcher will inform participants about the study purpose, data collection procedures, and risks and benefits associated with participation. The researcher will also offer each interviewee the option to decline participation without consequence prior to the start of each interview. Finally, the researcher will ask interviewees to sign an approved consent form (sample attached) and will collect the signed documents.

Incentives: What incentives will be offered, if any? (Indicate whether or not subjects are to be paid, how and when they will be paid, amount, and the rationale for payment. The proposed payment should be commensurate with the time required for participation, travel expenses, and/or inconvenience assumed by the subject, but should not be so great as to constitute undue influence on an individual to assume risks of study participation that would not otherwise be undertaken.)

Apart from sharing results of the study with interviewees, the researcher does not intend to offer incentives for participation.

Risks/Benefits to Participants and Precautions to Be Taken: (This section should discuss all possible risks and discomforts from participation in the study, indicating both severity and likelihood of occurrence for each. Risks may range from the physical to the psychological. Inconvenience, travel, or boredom may also be considered risks of participation in the study. The methods that will be used to minimize these risks should also be discussed. Many studies hold the potential for loss of privacy and confidentiality. These concerns should be noted in this section. If subjects are vulnerable populations, or if risks are more than minimal, please describe what additional safeguards will be taken.)

Risks and discomforts from participation in the study are minimal. Interviewees will be informed of the possible risks and discomforts prior to the interview start and prior to being asked to sign the informed consent document. Risks to be considered include inconvenience of time that it will take to complete each interview. The researcher will minimize this risk by scheduling each interview in advance and at the convenience of the interviewee. Another potential risk is the loss of subject privacy and confidentiality. The researcher will minimize this risk by de-identifying participants in the final report, however subject identification may be possible as interviewee titles and locations of case studies may be noted. As stated, interviewees will be notified of these risks prior to interview participation.

In your opinion, do benefits outweigh risks? ☒ **Yes** ☐ **No**

Privacy/Confidentiality: (Please describe whether the research would involve observation in situations where subjects have a reasonable expectation of privacy. If identifiable existing records are to be examined, has appropriate permission been sought, i.e. from institutions, subjects, and physicians? What provision has been made to protect the confidentiality of sensitive information about individuals? Are research records anonymous? If not, there should be discussion of how records will be coded, and where and how they will be stored. It should also note where and how signed consent forms will be maintained. If video or audio tapes will be made as part of the study, disposition of these tapes should be addressed. In general, the IRB recommends that research tapes be destroyed as soon as the needed data are transcribed, and that only restricted study personnel be allowed access to the tapes. List the names of individuals who will have access to names and/or data. If other procedures are proposed [for example, retaining

tapes for future use, allowing individuals other than study investigators access to the tapes] justification should be presented and separate.)

Data collection will occur through a series of interviews and observations for each case study. In observation situations where subjects have a reasonable expectation of privacy the researcher will maintain this privacy by excluding all identifiable and sensitive information. Information gathered in such observation situations will be used in a general manner such as informing and preparing the researcher for the formal interviews and for context setting in the report. All other observations will occur either in sessions also available to the public, such as live and archived legislative committee.

Interviews will be recorded via audio tape. Once complete, each audio recording will be uploaded to a software, HyperTRANSCRIBE, where it will be transcribed and coded in a study database. All audiotapes will be locked in a personal safe or safe deposit box until they are uploaded and transcribed. The study database will be protected. Only the researcher and dissertation committee members will be allowed access to the tapes. Upon transcription, all audio recordings will be destroyed.

Signatures: ** If submitted by a faculty member, electronic (typed) signatures are acceptable. If submitted by a student, please print out completed form, obtain the faculty advisor's signature, scan completed form, and submit it via email. Only Word documents or PDF files are acceptable submissions.

Principal Investigator or Student	Date
Faculty Advisor (for student applications)	Date

If this research pertains to a grant opportunity:

Grant submission deadline:
Funding Agency and ID Number:

Students:
Graduate ☒ **Undergraduate** ☐

VITA

Kathleen Brock is the Higher Education Policy Associate Director at The University of Texas at Austin where she works with state and national institutional leaders, policymakers, foundations, and policy organizations to facilitate the development of institutional policy and productivity initiatives. Prior to UT Austin, Katie served as a legislative aide to Representatives on the Massachusetts' House Higher Education Committee and as an advancement officer at Colgate University. Most recently, Katie served as the Associate Executive Director of the Office of P-16 Initiatives at the Tennessee Higher Education Commission where she designed and coordinated the state's Gaining Early Awareness and Readiness for Undergraduate Program, College Access Challenge, College Access and Success Network, and Lumina Foundation for Education's Know How to Go and Latino Student Success grant programs. Katie taught Comparative Education in the Lipscomb University education doctoral program and currently co-directs the Higher Education Productivity with Dr. Harrison Keller at UT Austin's LBJ School of Public Affairs. Katie holds a bachelor's degree in international relations from Colgate University and a Master's degree in international education policy and management from Vanderbilt University's Peabody College.